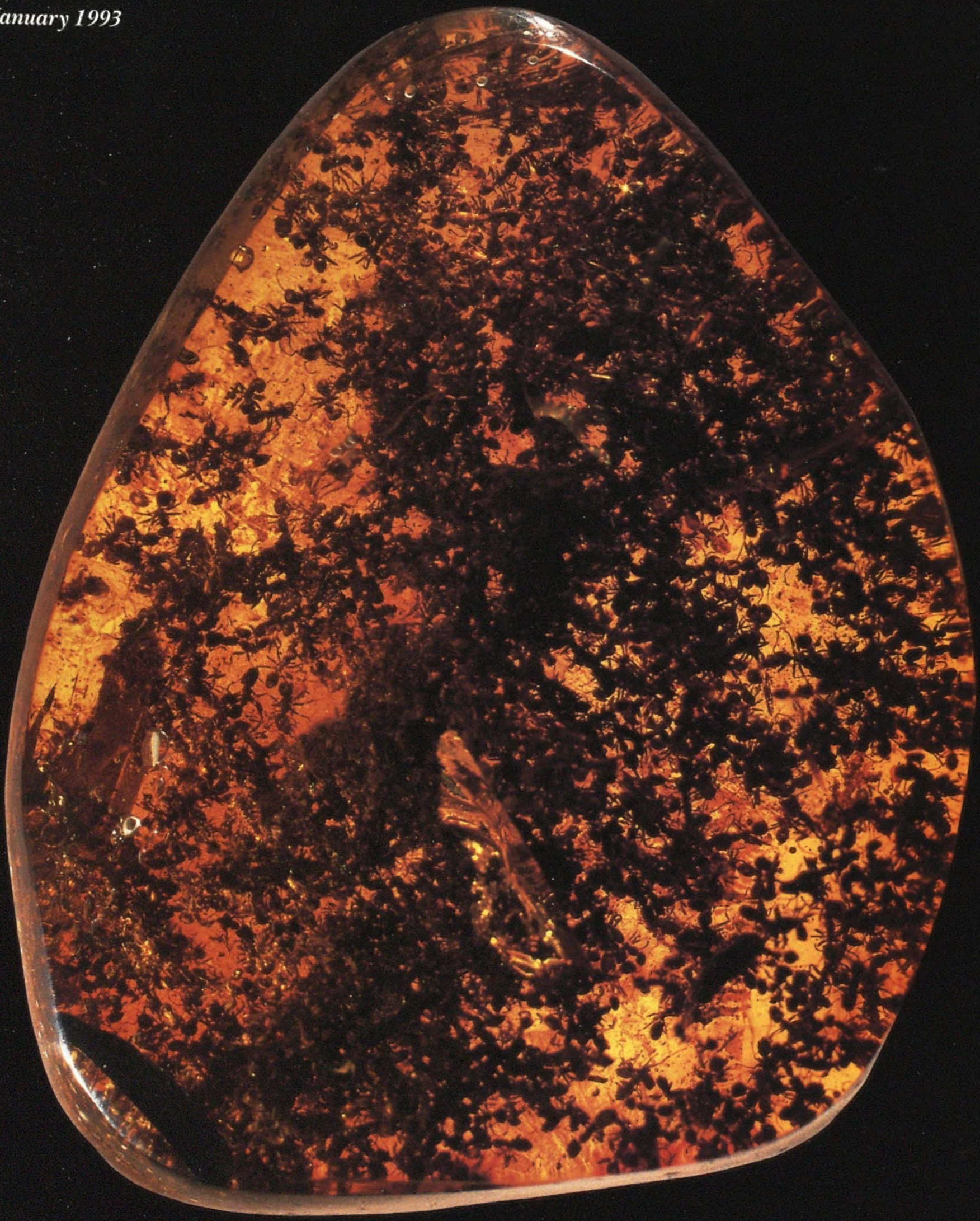
Smithsonian

January 1993



Amber is forever

Here, an ant colony frozen in time for 30 million years (p. 30)

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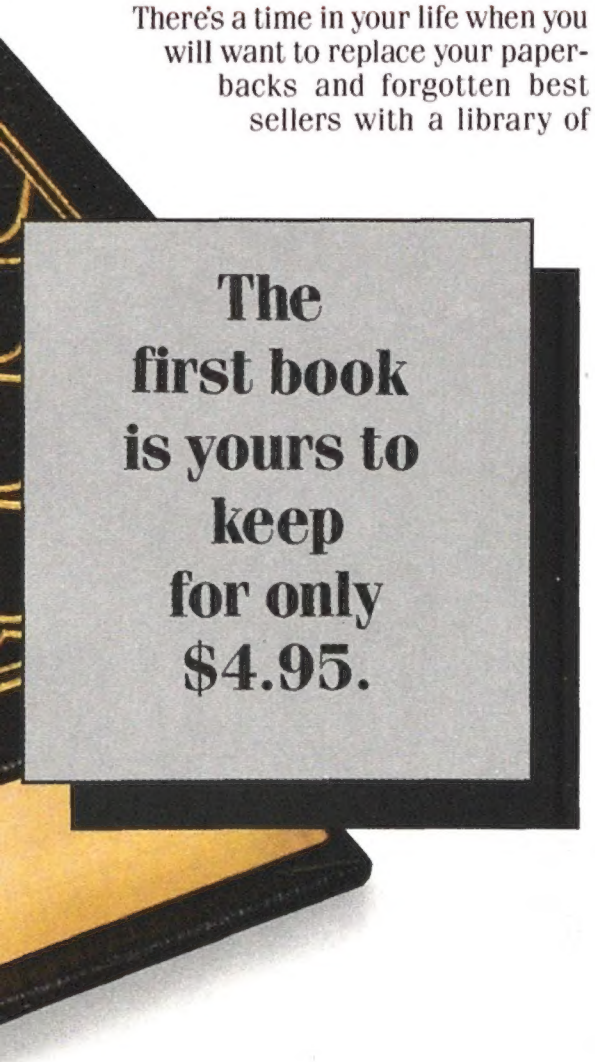

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Volume 23, Number 10

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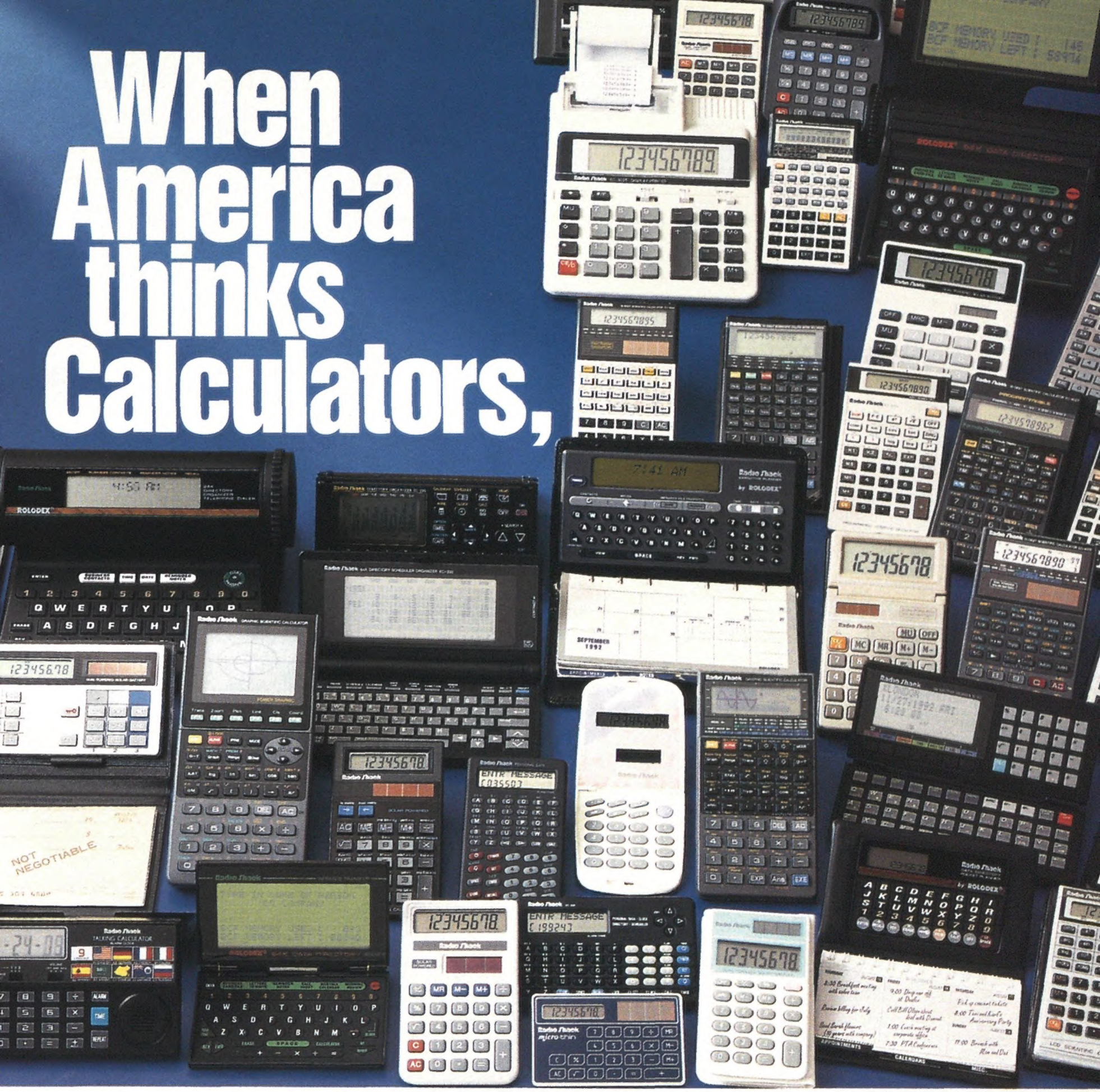

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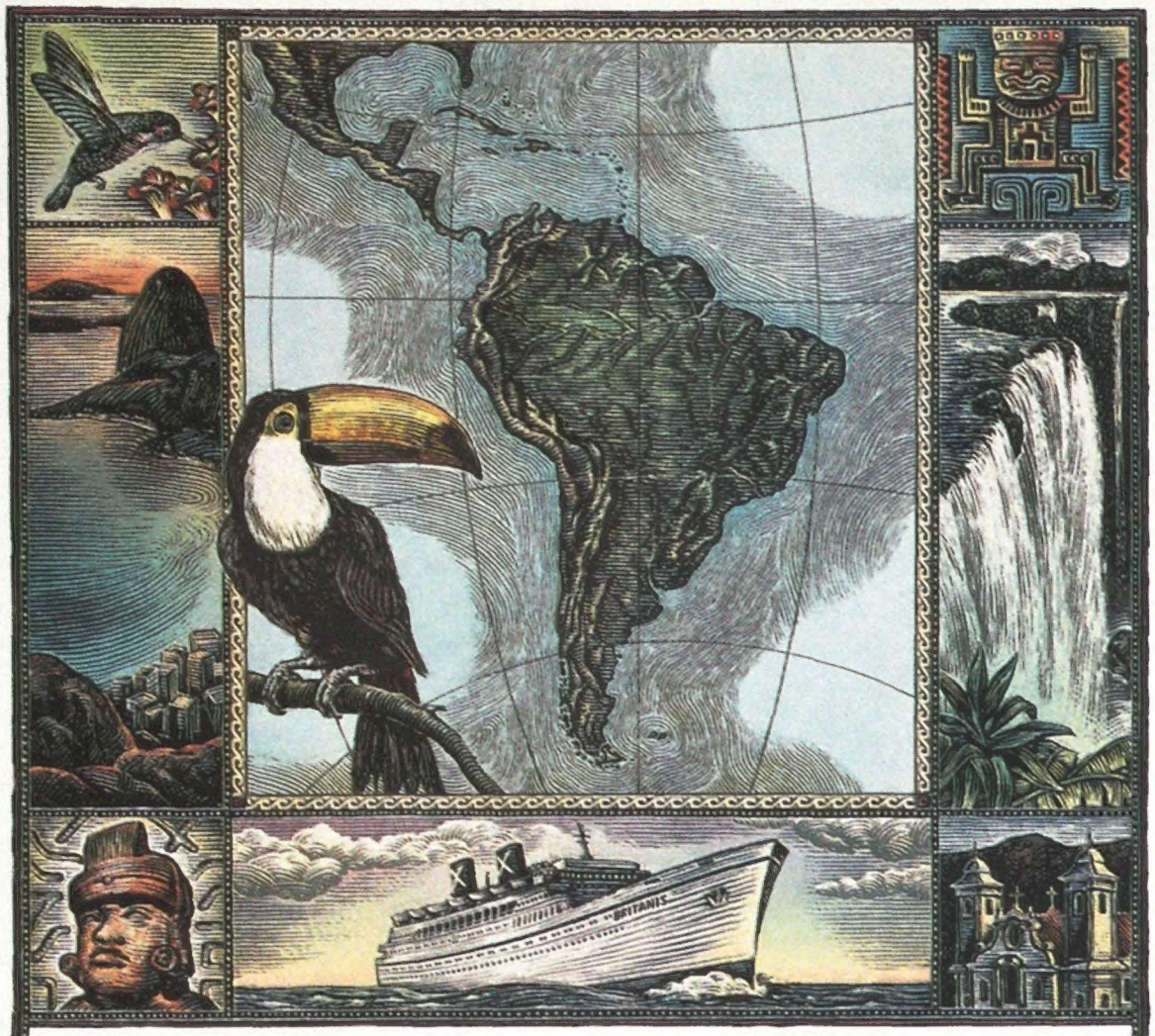

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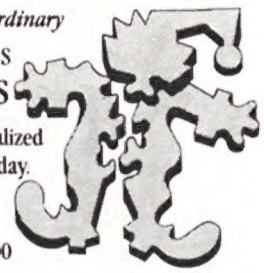

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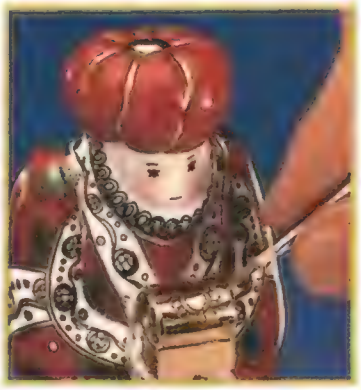

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Secretary Adams' comments

Smithsonian horizons

The growing use of synthetic polymers has created problems for museums and many items in their collections

Natural polymers must have been around for almost as long as Earth itself. Massive molecules that link long chains of identical smaller units, they occur widely in some basic minerals and are omnipresent in the fibers and proteins that sustain and activate all life. Formed under natural conditions, some are immensely stable. Others are subject to the equally natural processes of growth and decay characterizing all life cycles, including our own.

Synthetic polymers, on the other hand, are largely products of a relatively young chemical industry. Among the earliest still in use are rayon, synthesized late in the 19th century, and the plastic resin Bakelite, which followed in 1907. A whole family of common fibers began with nylon in the 1930s, replacing silk, which was in short supply during World War II. The development of synthetic rubber similarly received a major stimulus because of wartime shortages.

It is only since that time that polystyrenes, polyvinyls, polyacrylics and polyurethanes have entered our vocabulary—reflecting the remarkable speed with which they have become the dominant coatings, adhesives, containers and basic constituents of objects that pervade our working as well as recreational environments. Most of these later, increasingly heterogeneous, synthetics can be viewed as children of the petroleum industry. Hydrocarbons are their primary constituents. Their starting materials are prepared by modifying acetylene at high pressures and temperatures, often by the use of catalysts. These are all areas in which oil refineries were the pioneers.

While in no sense an adjunct of the oil or chemical industries, the Smithsonian does face an increasing challenge in coping with their synthetic polymer products. Formed from very reactive chemicals, they can be sensitive to light, air and heat, initiating further degradative reactions. Synthetic polymers' life spans are generally reckoned in terms of a few decades or less. How can we tell whether they will remain stable and unaltered across the much longer spans of years for which museum collections are intended? Where they do not—and color changes and structural breakdowns in some collages and sculptural works in celluloid are examples of this—what can be done to arrest (if not reverse) the destructive processes of deterioration? Conservation along these lines is neither a large nor particularly urgent subject of research in the great industrial laboratories. By default, it falls to museums.

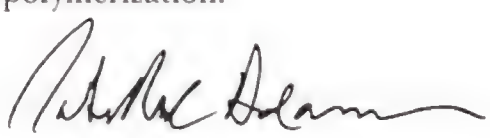
The preservation of composite materials poses particularly vexing problems, and costumes, for example, are almost characteristically composites. A gown worn by Eleanor Roosevelt in 1941 is trimmed with simulated pearls, with cellulose nitrate as the bonding agent. Now the cellulose nitrate is deteriorating, and this is staining and weakening the fabric immediately adjacent to the pearls. Dyes and glues are other accelerants of discoloration and decomposition. Complex chemical reactions where metal braid on costumes has begun to tarnish can be even more difficult to cope with.

Ironically, our collection of astronaut suits from the space program is, in spite of its recency, showing signs of aging and decay. Designed to withstand vast temperature changes, micrometeoroids and harsh ultraviolet light, they combine advanced materials, such as aramid textiles, aluminized polymide films and Teflon-coated silicon fibers, with natural rubber and cotton. Well chosen for the needs immediately at hand, some of the suit materials are now oxidizing, becoming brittle, flaking and discoloring or curling into unnatural positions. Original weightlessness-training exercises in tanks of chlorinated water are apparently responsible for a further series of slow chemical reactions that exacerbates the damage to the suits.

The need for conservation of paintings has, of course, long been recognized; art restoration is a profession that goes back to long before the Renaissance. Yet conservation is taking on new overtones of uncertainty because of the introduction of modern polymers, both as artists' materials and as conservation tools. Acrylic paints, introduced in the late 1940s, now are the choice of many contemporary artists. How long will they last? Can it be assumed that conditions of temperature and humidity worked out by long-term trial and error for traditional oil paintings will continue to be best? Because of the differences in the physical and chemical properties of acrylic and traditional oil paintings, restoration measures used on the Old Masters are inappropriate for much of modern painting.

Until very recently, none of these were exactly measurable processes. Treatment remains a matter of art and judgment, with the advent of synthetic polymers having enormously complicated the interplay of variables. In oil painting, the thin layer of glue between painting and canvas turns out to create stress by shrinking and swelling at a different rate from the slowly drying and stiffening paint to which it is bound. Acrylic paintings, for the most part, are impossible to clean because artists typically refuse to use protective coatings. So, any departure from equilibrium is found to represent a growing risk.

Conservation is precisely an attempt to preserve the integrity and specificity of things antecedent and still vital. The need for it—but fortunately also the vision to persevere in meeting the need and the technical means to succeed—regularly arises under the troubling assaults and unfolding opportunities of dynamic aspects of modernism like synthetic polymerization.



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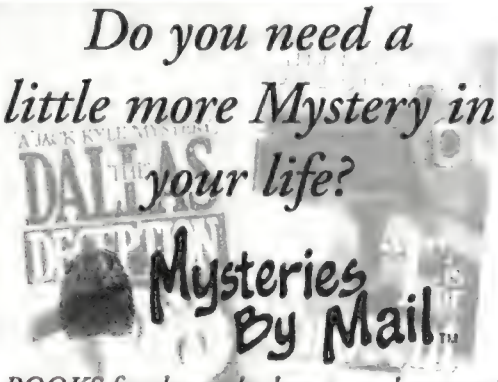

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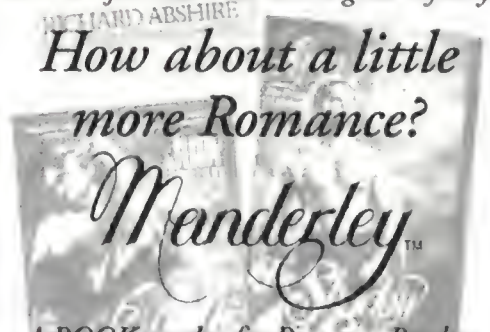

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Letters to the Editor

Jeeps

Dear Sir: Your November article brought to mind the Australian, Ben Carlin, who saw an amphibious jeep in action in India and conceived a preposterous idea that, with some modification, one could drive it around the world. After the war he found a wreck, spent years adapting it with long-range fuel tanks, and in 1950 drove into the sea off the coast of Nova Scotia with his bride, Elinore, from Boston.

They made it across the Atlantic to North Africa, surviving many trials including a hurricane. The description of Carlin's tussle with British police at Gibraltar for driving his aquatic jeep up the RAF seaplane ramp without proper credentials is hilarious.

Reaching England in August 1951, Carlin took off a couple of years to rebuild the vehicle and write a book, *Half-Safe*, about the adventures. Back into the Channel in 1954, the duo drove overland to India, where Elinore called it quits. Carlin continued, with an Australian as far as Japan, then with an American to Anchorage, where that mate jumped ship, leaving him to complete the circuit across Canada alone.

Cyril Fleisher
Chester, Pennsylvania

Dear Sir: With the jeep's windshield down, riders were vulnerable, and the enemy took advantage of this by stringing wire neck-high across tree-lined lanes where jeeps were known to travel. At high speed the possibility of decapitation was quite real. With a few lengths of angle iron, one resourceful G.I. created the wire-breaker bar, which quickly

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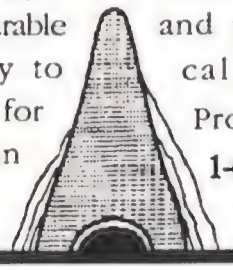

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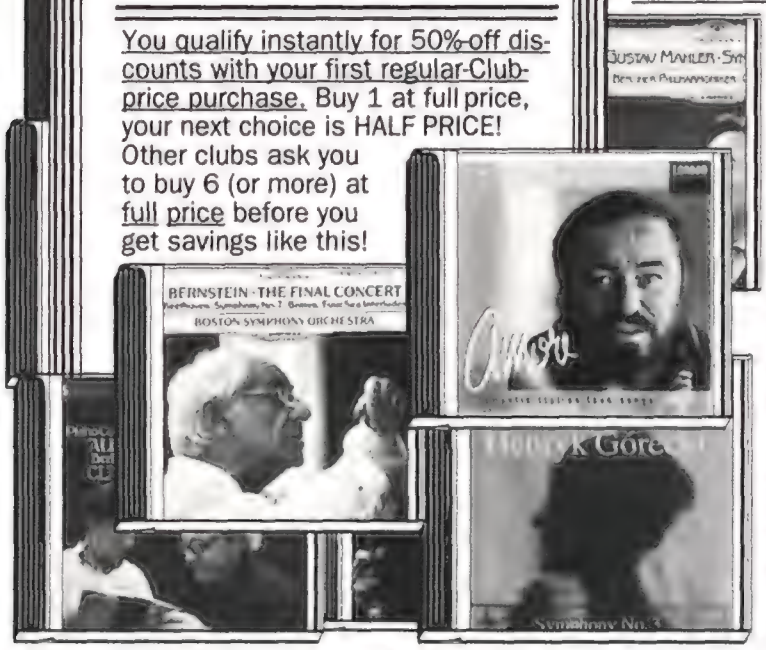

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became the fashion for frontline jeeps.
D. B. Lake
Wilmington, Delaware

Dear Sir: The first version of your cover cartoon appeared in *Yank*, a publication for servicemen in the South Pacific. The editors were evidently unaware of Bill Mauldin's popularity with the G.I.'s and reduced the cartoon to postage-stamp size. Miffed, Mauldin never did another cartoon for *Yank*.
Jack Gregg
San Diego

Dear Sir: In 1947, charged with investigating the case of a jeep lost at sea from an aircraft carrier, I backed the air officer against the bulkhead of his office and demanded he tell me the exact circumstances. The shuttle for the carrier's catapult didn't retract properly, so the ship's jeep was used to haul it back to firing position. All went well until the launching officer hit the launch button before the flight-deck crew unhooked the jeep, which was dragged down the deck and flung better than one-quarter of a mile ahead of the ship, with driver and passenger "enjoying" the ride. Fortunately, neither was hurt.

As naval auditors demand a rational explanation for all major articles of equipment expended, I soberly wrote for our admiral's signature that the jeep was lost overboard during the apparent passage of an undetected tsunami. One jeep now reposes in 3,500 fathoms, 100 miles south of Guam. At least it *tried* to fly, adding another aspect to its versatility.
Lewis B. Melson
Annapolis

Dear Sir: The 1942 jeep that has been and continues to be a personal part of my life was delivered to the Army on May 25, 1942. It came to me on the Fourth of July, 1976, as an old reliable at the family cabin in Arizona's rugged Mongollon Rim country. My children have learned to drive in it; it's very understanding. And if you can drive a jeep, you can drive anything.

A near-tragic accident in 1985 provided me with 50 stitches in my head and reduced the jeep to a metal pretzel, although it was still running, upside down, when I came to. The late Indy automotive genius Clint Brawner helped me restore the original engine; I worked for six months on everything else. Now fully restored [above], it gets invited to better places than I do. Carl

Gorman, the Navajo leader, has used it in reunions, and it has been guest of honor at the Phoenix Zoo's black-tie "Wildest Ball in Town."
Gary Avey
Phoenix, Arizona

Butte, Montana

Dear Sir: The Cornish were one of the most important and distinctive ethnic groups in Butte mining. From Cornwall in far southwest England, these Celtic people took their hardrock mining skills all over the world. Known as "Cousin Jacks" for their manner of inquiring about a job for "me cousin Jack in the aould country," they were in great demand in the United States because, along with their skill, they could speak English, albeit with a peculiar accent. Their meal-in-a-crust, known as a pasty, was the perfect lunchpail dinner.
R. H. Chamberlain
Flournoy, California

Tuberculosis

Dear Sir: My great-uncle, Dr. John Harvey Kellogg, was medical director of the Battle Creek Sanitarium. He came up with literally dozens of innovative health notions, including the sanitarium's diet program. It excluded meat and substituted health foods that his youngest brother, Will Keith Kellogg, spent many a night in the test kitchen developing. The health foods evolved into Kellogg cereals.

"Uncle Doc" favored G-string covering, winter and summer, when he ran a mile for exercise on the sanitarium roof. Despite considerable embarrassment to the family, he reveled in the publicity shots published in periodicals of the day. To put an end to this "folly," Will attempted to have his brother declared incompetent, but to no avail. Both brothers lived until the age of 91, with Will leaving the bulk of his Kellogg Company fortune to the W. K. Kellogg

Foundation, now with assets of more than $5 billion.
Norman Williamson jr.
Claremont, California

Dear Sir: I would like to set the record straight on your comment regarding Selman Waksman having discovered streptomycin by isolating a chicken-disease fungus (really a filamentous bacterium) from barnyard soil. Two cultures were isolated by graduate students: one by Doris Jones of Dr. F. R. Beaudette's group, from the throat of a sick chicken. The other, by Albert Schatz, came from field soil, gave greater yields and became the original production strain. Central to Dr. Schatz's PhD dissertation in 1945 was his development of an antibiotic screening program to include tubercular microbes, and the discovery of streptomycin. He shared the 1948 patent with Dr. Waksman as its codiscoverer.
Douglas E. Eveleigh
Professor of Microbiology
Rutgers University
New Brunswick, New Jersey

Grizzly bears

Dear Sir: In the early '30s, when I was 5 or 6, my folks lived in West Yellowstone on Madison Fork Ranch. In summer we went to the park almost daily for picnics and to watch the bears eat garbage from the hotel restaurant. They helped themselves to milk left on the doorsteps of tourist cabins. One bear, "Jesse James," would sit in the middle of the park road, forcing cars to stop in hopes the occupants would feed him. The thing to do was to throw something out and leave quickly. Some visitors, tarrying, were terrorized when Jesse took his claws to the cloth tops of their convertibles.
Helen Kinasz
Pottstown, Pennsylvania

Urban myths

Dear Sir: When I was a college student at Ohio University in Athens in 1984, a supposed prediction by tabloid psychic Jeane Dixon held that a man dressed up as Little Bo Peep was to enter a sorority house at a Midwestern university on Halloween and massacre the sorority sisters. That weekend, needless to say, many sorority women went home, and the most popular costume for men was Little Bo Peep.
Katherine Kause Frank
Mayfield Heights, Ohio

American Academy

Dear Sir: When the engagement of a beautiful girl to a rich, elderly Cuban planter was announced in New York in 1859, a satirical poem, "The Diamond Wedding," appeared anonymously. The girl's father learned the identity of the poet, Edmund Clarence Stedman, who was mentioned in your article, and enraged, challenged him to a duel. Stedman accepted, but the father, deciding Stedman wasn't worthy of a duel, insultingly withdrew the challenge. Years after the poem appeared the bride was widowed, and she and Stedman became great friends. He gave a banquet in her honor on the 20th anniversary of the publication of the poem.
Edward F. Bergman
The Bronx, New York

GRACE

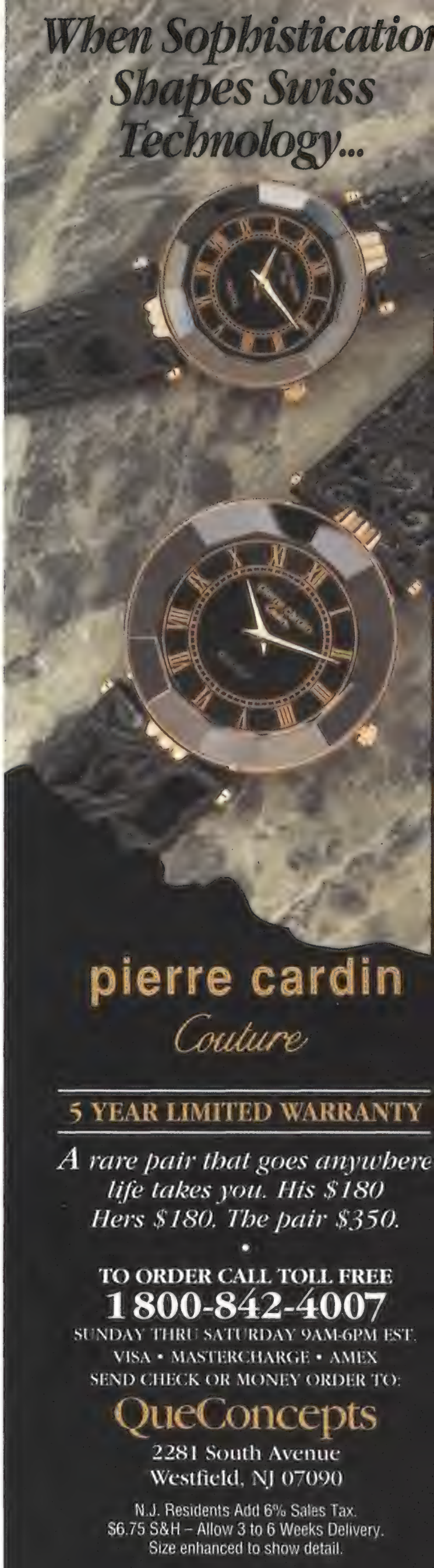
Dear Sir: There is an amazing project developing in Baltimore—the American Visionary Art Museum. AVAM's founder, Rebecca Hoffberger, involved with outsider art for eight years, is its most fervent noncommercial crusader.

This summer Congress unanimously passed a resolution naming AVAM the national museum, educational center and repository for outsider-visionary art. With pure hard work, imagination and totally unsalaried effort, Rebecca has led a drive that raised more than $4 million, secured from Baltimore the commitment of its finest remaining three-quarter-acre site in the Inner Harbor, and developed an exciting, critically acclaimed facility design.
Mark Barry
Glen Arm, Maryland

Junk mail

Dear Sir: The downside of Bruce Watson's fantasy of incinerating junk mail for home heat is that much printed material contains lead-based ink, plastics and residual dioxins from bleaching paper and is not environmentally suited for indiscriminate burning without appropriate chimney scrubbers.

A safer method of ridding ourselves of this nuisance, one that sends a message back to the perpetrators, is to use the conveniently supplied business-reply-mail envelopes to return the clutter to the point of origin.
William F. Archibald
Norfolk, Massachusetts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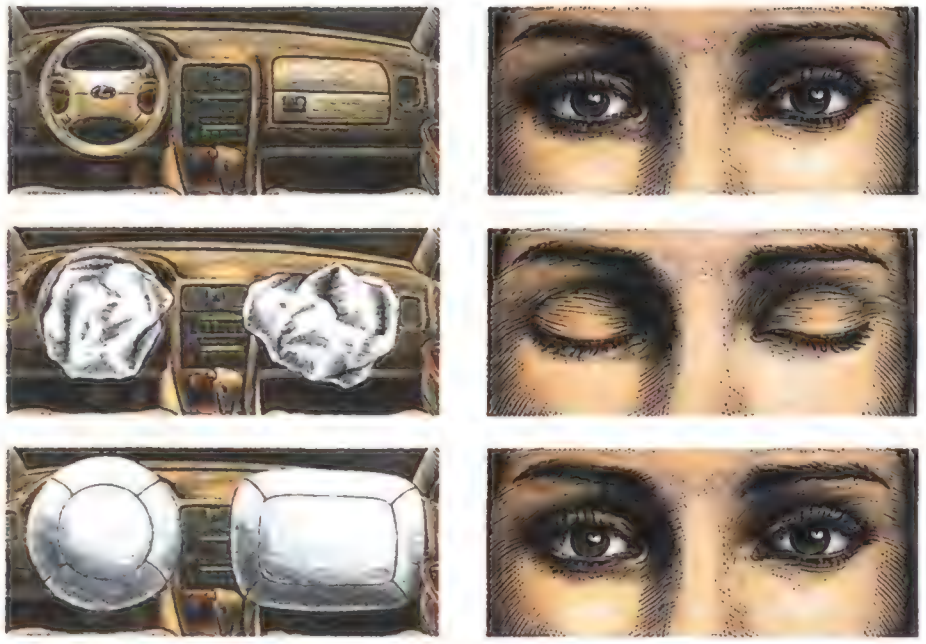

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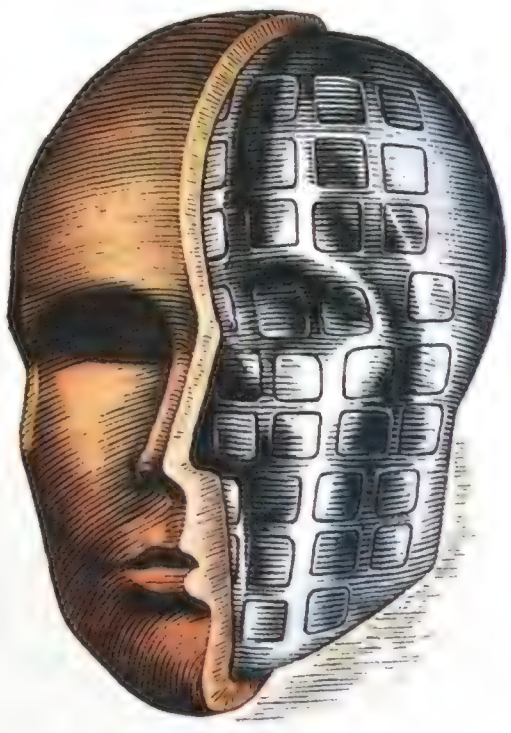

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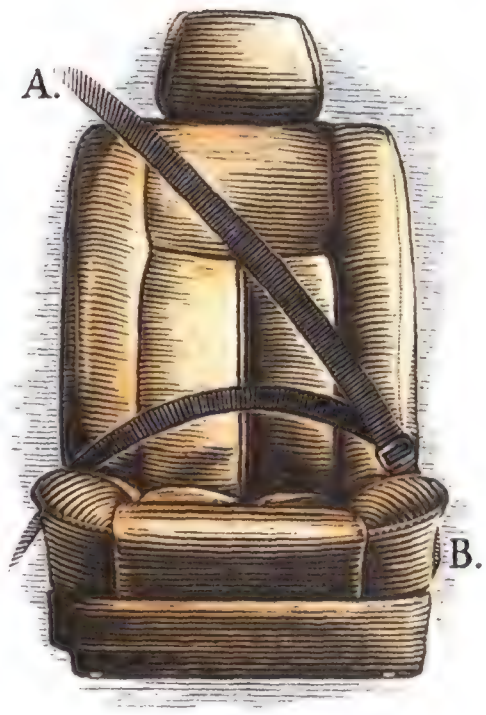
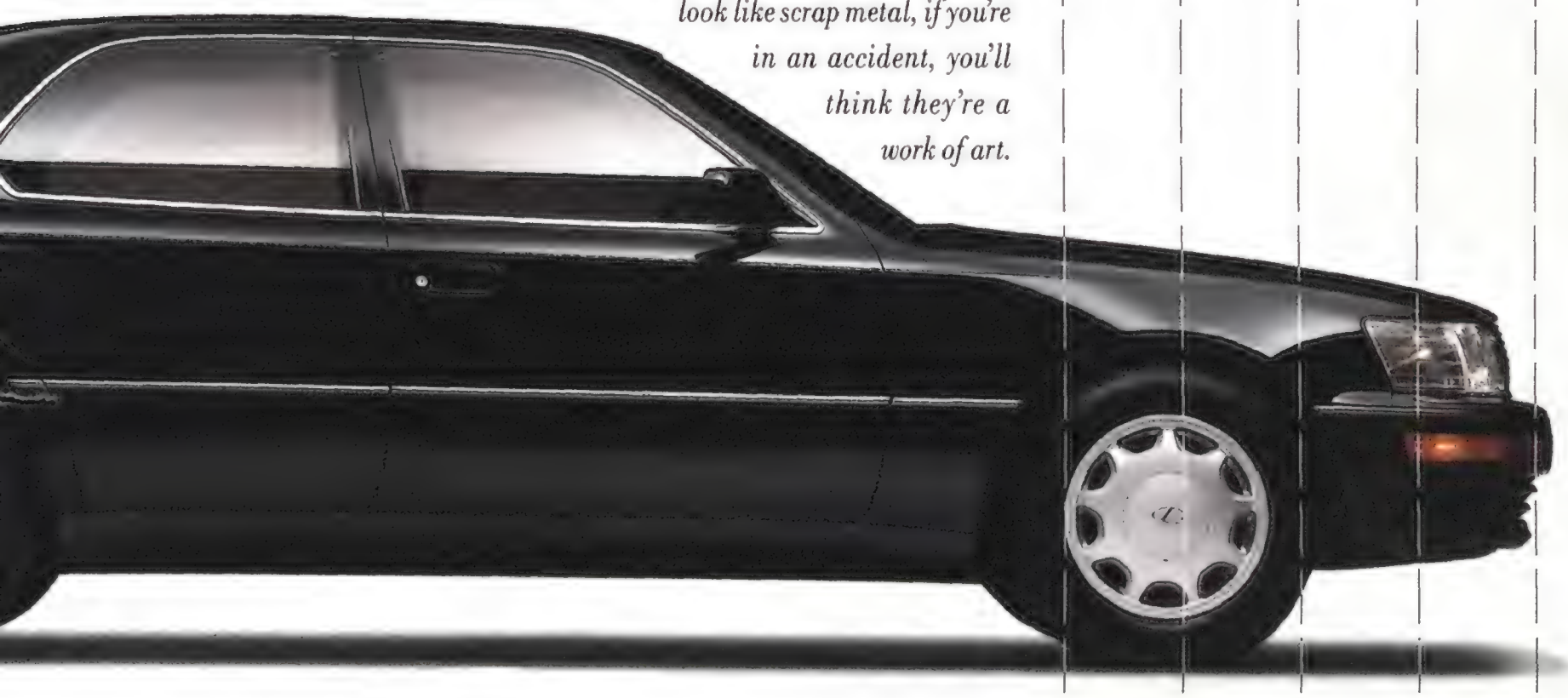


5. Fold here.

This LS 400 has just encountered a 30-mph frontal collision. Those creases you see are energy-absorbing crumple zones. And though they may look like scrap metal, if you're in an accident, you'll think they're a work of art.



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Phenomena, comment and notes

Here's how I paid off the national debt while wearing a scarlet suit . . . and other daydreams for a new year

For anyone toying with notions of self-improvement and looking for a start date, there are lots of new years to choose from. Our birthdays are the ticks that measure the passage of what for each of us is the most important stretch of time, our lives. Each birthday we begin a new year, a new master plan. For many of us, even decades removed from the classroom, there is something special about September and the promise, if not the delivery, of cooler, invigorating weather that calls for fresh starts. The cosmically inclined might opt for the vernal equinox, the moment in March when the sun crosses the celestial equator from south to north and a new astronomical year begins. The classic time to begin anew, however, is the new calendar year, the Spartan days of January. Those 12 new pictures on the wall announce the proverbial clean slate.

Give me a nickel for every resolution I've made and I'll drive home in a Jaguar. I'm like the ever-hopeful Charlie Brown, running up once again to kick the football only to have Lucy pull it away one more time. In this analogy, unfortunately, I am Lucy as well as Charlie. The obvious resolutions I make and break every few days, rather than once a year. Exercise is like *Remembrance of Things Past*: I'll get back to it just as soon as I have some extra time. I swear I'll write those letters just as soon as this show is over.

This is the year, I decided, to go beyond the obvious. It occurred to me that as a public service, I would try to dress with more flair, more verve, especially more color. Middle-class males of my world tend to choose gray, brown or very dark blue. The goal is to be as unobtrusive as possible, to go to any length to avoid calling attention to oneself. Watching our elected male representatives on C-Span is to watch the very same suits asking for the floor or yielding to the distinguished gentleman from wherever. Our women representatives, on the other hand, are likely to be making laws while dressed in bright red or electric blue. Not that many centuries ago gentlemen were as splendidly attired as ladies. Some, as always, overdid it of course, as we see in late-night movies. But they had the right idea. Only lately has it occurred to me that choosing color can be more than screaming "Look at me!" to the world: it is also a way of making this drab world more visually interesting. It is on a par with working at making interesting conversation at a dinner party. Actually such a movement has already begun among men who buy their outerwear from outdoor stores. One Assistant Secretary here at the Smithsonian wears the required gray suit; when he goes outside, however, he throws on a bright blue-and-yellow parka shell and immediately transforms himself into a much more human, approachable person.

It seems possible that if we all had more visual stimulation, we might be more mentally stimulated as well. But somehow the thought of appearing for work some bright Monday morning in a scarlet suit or a Kelly green jacket seems outside the realm of the possible. No, cross that one out.

Still casting about for a doable resolution, I dared myself to think big, really big. The biggest thing I could think of was the national debt, a number to be reckoned with. Convert the dollars to miles and you have the distance that a photon of light, moving at 186,000 miles a second, would cover from January 1 until September 13. Why not, I thought, start a national campaign to have us, the citizens whose country this is, voluntarily pay off the debt so we can get on with our business? Individuals have been sending money in for this purpose, in fact, ever since the government set up a mechanism in 1961. (To join in, write a check to the Bureau of the Public Debt and mail it to the Bureau of the Public Debt, Department G, Washington, D.C. 20339-0601.) In fiscal 1992,

citizens sent in $3.5 million. That's with no campaign, no organization, no publicity. So let's think big. If I were to send $100, that would free up $10 a year that now goes for interest, administrative costs, overhead, et cetera, on that hundred. If you did the same, it would free up another ten-spot. If 100 million of us sent in $100 apiece, out of simple gratitude for what this country has meant to us, that would come to a tidy $10 billion. If we kept it up for five or ten years it would start to add up, as the late Sen. Everett Dirksen would have said, to real money. We could use birthday cards to send the money, mailing them on the Fourth of July. (Granted, at this rate it would take 400 years to pay off the present debt: it is not for nothing that astronomical similes seem apt. But even the smallest step would slow the rate at which things are now getting worse. Someday it could turn the tide.)

Like so many of my ideas, this one is not unique to me. The *New York Times* reported in November that Sven-Olof Lindblad, who owns Special Expeditions Inc., an adventure-travel business, was going to donate $500 for every customer who signed up for a pre-April trip before the end of the year, up to a total of $500,000. Lindblad became a U.S. citizen last year. "This country has given me great gifts," he told the *Times*, and he wanted to give something back.

How you look at the government depends partly on your age. For those of us sailing close to geezerhood, it's a little as though the children have taken over the family business and dug themselves into a hole. They don't seem able to get out. It is time to switch metaphors and bail them out. We don't need to wait for officials in Washington to tell us how or to set up a ponderous program or to write another 500 pages of tax law. We can just do it.

So I jotted down: "Solve national debt." Clear the kitchen table (where all the best campaigns begin) and pound out letters to the editor and op-ed pieces for every paper in the country. Call radio talk shows. Get the word out. But then I had to cross it off. The idea was too good. It would have meant appearing on all those television shows. All those awards dinners and parades honoring me as a financial savior. All the demands that I stand for public office (U.S. Senator or above, of course) and spend the rest of my life in a gray suit.

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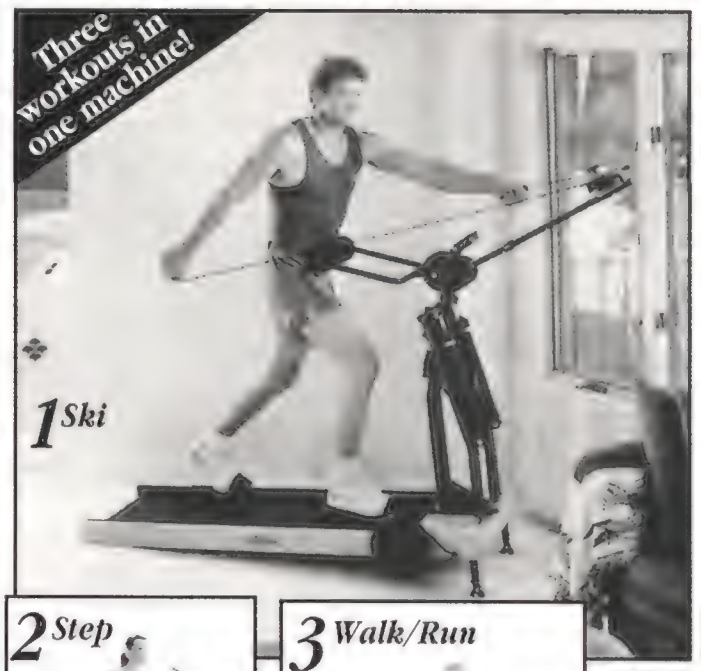

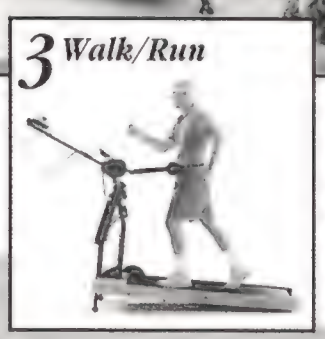

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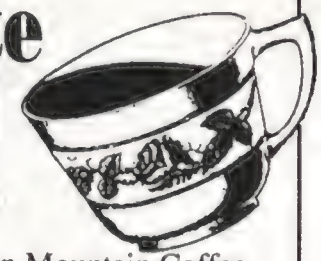

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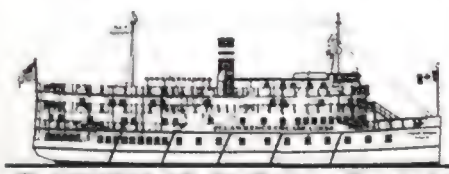

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ose. Time to confront reality. Let improvement begin closer to home. So this is the year I'm going to stop looking at nature only when I mark it on my appointment calendar and then drive to an approved spot, a park or refuge, to see what I can see. Instead I will make an effort to see it where it is—everywhere. The binoculars will no longer be left in the knapsack in the closet; rather they will be on the windowsill so the next time a hawk comes cruising over these eighth-floor balconies (it couldn't be looking for cats or yappy little dogs, could it?) I'll have a fighting chance to see it well enough to identify it. When I spend a spring lunch hour in that little circular park with the cobblestone pavement, I'll have a field guide or two to identify the plants taking over the interstitial spaces, the ones that appear to be grasses and the ones that look like algal refugees from a coral reef. With different guides on a different day, I can put names to the ants and beetles that bestride these tiny universes, and read enough to figure out this ecosystem under my feet. A few years ago the local papers made much of a bald eagle flying down a north-south artery in the heart of Washington. With a lightweight pair of binoculars in the briefcase I lug around anyway, I'll have a shot at identifying large, totally unexpected birds.

Most important, no more passive observing from a clean, dry, safe remove. It is time to get dirty and wet. Dignity be damned in those parks and refuges: lie face down in the bushes to see for the first time all those invertebrates at the heart of the ecosystem (I'll have to pick my spot so I don't get arrested). Link up with one of the Save Our Streams projects and wade right into the mud and the trash. Volunteer for a National Park Service team that is ripping out exotics escaped from gardens of long ago to bring a place back to something closer to its natural state.

They are all little things, but they all make a difference. Pulling one spray-paint can out of a stream improves the environment by just that much. Wearing a bright, bold shirt (I'll go that far) will brighten up one corner of a meeting room. Giving a hundred dollars to my country will ease its problems by that infinitesimal amount. And it's all totally selfish: it feels good. So I'll get right on it. Sometime next week. Positively.

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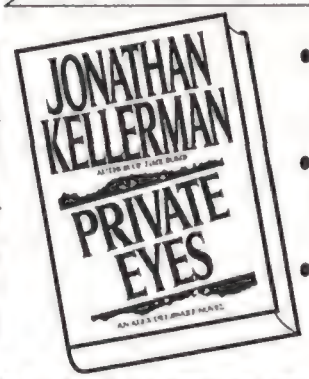

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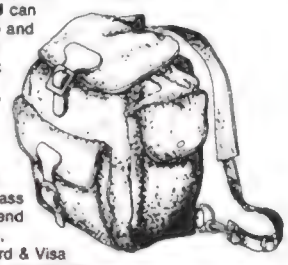

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Special January exhibits, events

National Portrait Gallery
In Pursuit of Fame: Rembrandt Peale 1778-1860 (through February 7) The life and work of the early American painter. See *Highlights continued*, page 26.
"The Family 1976": Richard Avedon's Portraits for Rolling Stone (January 22-June 6) Portraits by the famed photographer capture America's most powerful figures in 1976.
The Telling Image: Portrait Photographs from the Archives of American Art (January 22-June 6) Selected images of artists and photographers, 1850 to 1970.

National Museum of American Art
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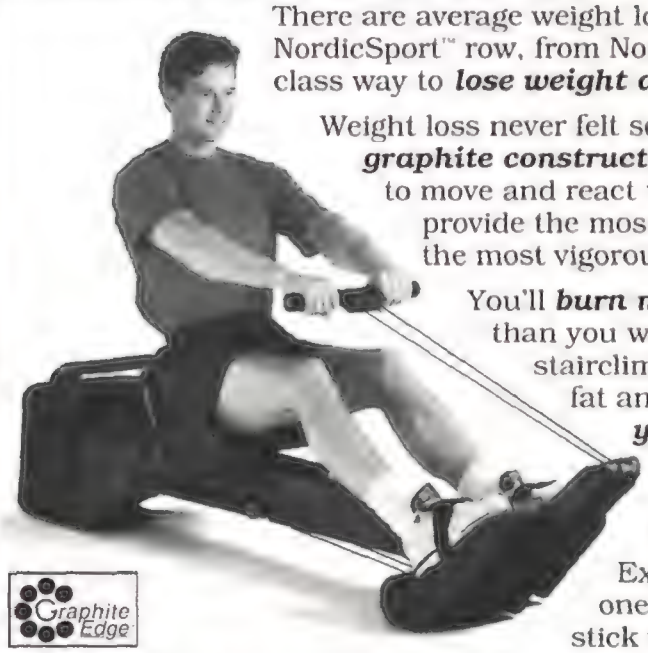

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Renwick Gallery
American Crafts: The Nation's Collection (through January 24) Exhibition honoring the Renwick's 20th anniversary showcases 130 objects that span the development of crafts in the 20th century.

National Museum of Natural History
Seeds of Change (through May 23) Quincentenary exhibit explores the exchange begun 500 years ago between the Old World and the New.

National Zoological Park
Amazonia New permanent installation re-creates a microcosm of the world's largest rain forest and river habitat. Exhibition examines the wonders of this richly diverse ecosystem.

National Museum of American History
GI: The American Soldier Experience in World War II (opens January 19) Permanent exhibit looks at the experience of the average American G.I.
Hidden Americans: Photographs of Gypsies by Carlos de Wendler-Funaro (January 15-March 28) Gypsy lifestyles and culture, from the 1920s to '40s.

National Air and Space Museum
Where Next, Columbus? New gallery looks ahead to the next 500 years of exploration.
Star Trek (through January 31) Show celebrates the 25th anniversary of the famed TV series. Passes may be required; call (202) 786-2122 for details.

Arthur M. Sackler Gallery
Joined Colors: Decoration and Meaning in Chinese Porcelain (January 31-November 28) Exhibit highlights significance of 15th- through 19th-century porcelains as bearers of auspicious images.

National Museum of African Art
Elmina: Art and Trade on the West African Coast (through February 28) Exhibition focuses on Elmina, a 15th-century trading post on Africa's Gold Coast.

Hirshhorn Museum & Sculpture Garden
Joseph Kosuth WORKS (through January 25) Site-specific installation by the contemporary artist incorporates "found" texts from Kafka and other sources.

Anacostia Museum
Richmond Barthé/Richard Hunt: Two Sculptors, Two Eras (through February 28) Exhibition surveys the influential careers of these two African-American sculptors.

Arts and Industries Building Experimental Gallery
The Kids Bridge (through March 1) Hands-on exhibit from the Children's Museum of Boston explores issues of identity, ethnicity, race and racism.

S. Dillon Ripley Center
Imperial Austria: Treasures of Art, Arms & Armor from the State of Styria (through January 24) Works from the late Middle Ages through the 17th century.

National Museum of the American Indian (New York)
Pathways of Tradition (through January 24) The George Gustav Heye Center's first public exhibit in its new home at the Old U.S. Custom House previews the collections of the new museum.

Cooper-Hewitt Museum (New York)
The Power of Maps (through March 7) Exhibition examines the significance of maps as instruments of communication, persuasion and control.

Smithsonian on the air

Smithsonian Presents Invention Series of half-hour television programs explores spirit of innovation behind invention. Tuesdays at 9 P.M., EST, on the Discovery Channel. Check local cable listings.
Dialogue Weekly public radio series on national and international affairs features renowned scholars, authors, political figures. Check local listings.

Resident Associate Program

To become a Resident Associate, or for fee and ticket information, call (202) 357-3030. January events include:
Inside the Metropolitan Museum of Art: An Evening with Thomas Hoving (January 14; 6 P.M.) The former director of the Met relates intriguing stories of masterpieces, money and society.

Smithsonian Institution Traveling Exhibition Service

SITES organizes and circulates exhibitions to cities throughout the United States and abroad. To sponsor a show in your community, write SITES, Smithsonian, Washington, D.C. 20560. January exhibits include:
• Baltimore, Maryland (January 16-February 28) *Africa's Legacy in Mexico: Photographs by Tony Gleaton,* Eubie Blake National Museum and Cultural Center.

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The BMW 525i: $35,600. The Mercedes 300E: $42,950. The Lexus LS400: $44,300. The Acura Legend: $28,000.† Those are the kinds of numbers people believe they have to pay for a high-quality, high-performance luxury sedan. (And of course, the companies that make these cars, not being dumb, en-

courage this belief by raising those prices every year.) However, the time has officially come to take a long, hard look at the relationship between a car's price and its value. What's made that necessary is a startling development called the Chrysler Concorde. The Chrysler Concorde is a new luxury sedan with

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ury sedan in the world will stify its price.

more horsepower than a BMW 525i, more torque than a Nissan 300 ZX. And thanks to a revolutionary new automotive architecture called "cab forward," more interior room than any Acura, Infiniti or Lexus. It has a list of standard features that reads like a wish list (including dual air bags). And when it comes to how it drives, *Motor Trend* describes it this way: "lithe and agile, the balanced handling of a sports sedan, a ball to drive." Which brings us to the bottom line. The Chrysler Concorde, fully equipped, costs $23,432.* No, that's not a hallucination. It just means that one carmaker in the world is asking a basic question. Why should driving a high-quality, beautifully performing automobile be a luxury reserved for the privileged few, when it can be offered to the privileged many? For more information, call 1-800-4A-CHRYSLER.

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Highlights continued

The many faces of Rembrandt Peale

By birth, name and nature, Rembrandt Peale was destined to become an artist. Son of the distinguished Colonial painter and naturalist Charles Willson Peale (three other sons were named Raphaelle, Titian and Rubens), Rembrandt painted his first portrait when he was 13 years old.

But Rembrandt Peale was more than the talented son of a celebrated father—more than the precocious creator of admirable portraits. He was an ambitious, driving, highly skilled painter who sought fame for himself, his country and his profession. He produced a prodigious body of work—some 1,200 pieces—during a career that spanned nearly 60 years. Noted for his ability to reproduce three-dimensional forms, capture a good likeness and successfully express character and personality, he was also a writer, educator, and founder of the Pennsylvania Academy of the Fine Arts and the Peale Museum in Baltimore. Primarily a portraitist, he also painted landscapes and historical scenes, and was among the first early American artists to travel to London, Paris and Italy.

Now Peale is the subject of a comprehensive exhibition at the National Portrait Gallery, cocurated by Lillian B. Miller, editor of the Peale Family Papers, and Carol E. Hevner. "In Pursuit of Fame: Rembrandt Peale, 1778-1860," on view through February 7, brings the artist out of the shadow of his father's renown and affirms his standing as one of America's most important early portraitists.
Diane M. Bolz

Skillful handling of textures enriches loving portrait of wife Eleanor, c. 1814.

Thoughtful, gentle visage of oldest daughter, Rosalba, was painted c. 1820.

Peale produced a series of "porthole" portraits of George Washington in 1850s.

Brooding image of sculptor Horatio Greenough conveys physical presence.

In 1828 *Self-Portrait,* Peale was experimenting with light.

Eloquent rendering of younger brother Rubens is from 1801.

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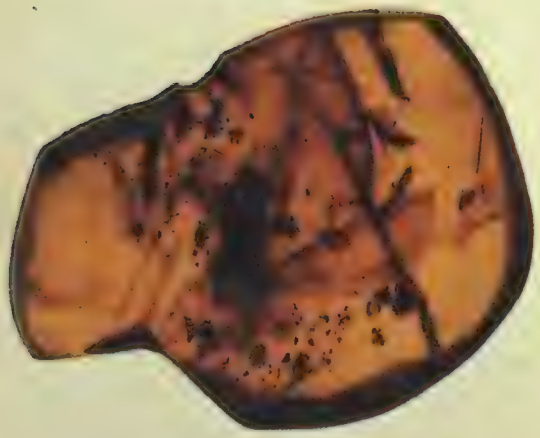


A2 A2
Rob1 Rob2

By John F. Ross

Treasured in its own right, amber is a golden window on the long ago

The hand-carved amber that once decorated a palace may be lost, but an impossible dream of paleontologists might yet come true

The wasp is so perfectly preserved that I handle it gingerly, making sure that its evil-looking stinger is no longer twitching. Though it is locked inside a chunk of amber the size of a plum, the veins in its wings and the facets of its eyes are clearly visible, as if a nervous homeowner had swatted it with this morning's newspaper and dropped it into a jar of honey.

In fact, Susan Hendrickson, a paleontologist, tells me, the wasp is about 30 million years old, transported to the present by an odds-defying process inside a capsule of fossilized tree resin known as amber. It begins one fateful day during the Oligocene Epoch when the wasp settles on the sticky bark of a tropical tree that is oozing resin with the consistency of glue. The wasp becomes mired in this miniature La Brea tar pit and dies. Resin continues to drip down the tree, completely enveloping the wasp. Eventually, the tree dies and decomposes, leaving behind the wasp in its translucent tomb. Despite inexorable geologic forces that crush most organic material beyond recognition, turning it into coal, the resin with its imbedded wasp grows harder still. Streams carry the entombed wasp far from its original haunts. Millions of years pass, the continents move apart, and the climate cools. The wasp's species and a number of other insects, plants and animals die out.

Yet, the wasp itself remains, locked in a matrix of sediments deep within the Earth. Great geological forces thrust up the sediments with the amber and the wasp to form what will become the mountains of the Dominican Republic. Recently, on a bright sunny afternoon, Hendrickson pulls the wasp from a hole dug in the side of a mountain. Somewhere on its long trip, the hardened resin has fossilized into amber, the semiprecious stone used in jewelry.

This wasp and Hendrickson's other pieces are not destined for the jeweler but for a diverse group of scientists and collectors who study thousands of pieces of amber containing a menagerie of insects and animal parts, plants and other materials. A feather in amber intrigues Smithsonian expert Roxy Laybourne—previously, the fossil record has been mute about ancient bird feathers in the tropics. A stingless honeybee in amber doubles the previously known age of bees, prompting questions about the age of flowering plants. University of California entomologist George Poinar has an unrivaled opportunity to study a parasitic relationship between insects frozen in time. Smithsonian paleobotanist Fran Hueber may have found ash from a volcanic eruption in amber, hinting about conditions long ago and their effect on climate. There are the remarkably lifelike examples of lizards, butterflies, frogs and scorpions.

Of them all, a termite and a bee—both trapped in Dominican amber—are causing the most excitement. Scientists in New York and California respectively have isolated and sequenced pieces of DNA from them. These and earlier studies have opened a Pandora's box of speculation, energizing that netherworld where science meets the imagination.

No one has fanned imaginations on this subject more than Michael Crichton, whose science fiction best-seller *Jurassic Park* targets amber as the source of a plot to bring live dinosaurs into the 20th century. In the story, scientists isolate dinosaur DNA from the stomachs of biting insects that had feasted on dinosaur blood just before becoming entombed in amber. From the DNA blueprint, dinosaurs are cloned and again

Termites in amber, 30 million years old, are shown against laboratory breakdowns of their DNA patterns.

walk the Earth, as in a bad Japanese monster movie. Today, however, with the isolation of the termite's and the bee's DNA, some elements of this story are less far-fetched than once thought.

Upon casual inspection, amber seems rather ordinary. I first saw it where shirtless merchants displayed their wares outside the Peter and Paul Fortress in St. Petersburg, Russia (until recently, Leningrad, USSR). It resembled an inferior grade of plastic, I thought, as if some Soviet factory had overfulfilled a quota for cheap, yellow plastic necklaces. Yet, when one of the merchants held a piece of amber up to the sun, it seemed to pull the sunshine into itself and explode with brilliance.

The Greeks knew amber as *elektron* (the root of the modern word "electricity"), or "substance of the sun," perhaps because of its color or the fact that it collects a small negative charge when rubbed. Most pieces of amber are smaller than a fist and carry a silky sheen when polished. In the hand, amber is light and, after a few minutes, warm to the touch. It seems to carry away perspiration, probably one of the reasons that Frédéric Chopin handled small chains of amber before his piano performances.

In English, "amber" denotes both the fossilized tree resin and a color. Contrast this to the peasant dialects of Poland, where some 200 words are used to describe the substance's various shades and hues—such a high reading on the linguistic scale indicates a material well enmeshed in the social and historical fabric of the region. In fact, more than 250 colors have been described, ranging from rare blue and green colors, to the more common red, yellow, brown and gold.

Those Russian merchants hawking necklaces are the latest in a long line of amber traders, dating back to the Phoenicians, who have fueled the on-again, off-again interest in amber in both science and fashion. The infatuation of the Baltic peoples—Poles, Russians, Germans, Danes, Swedes, Lithuanians, Latvians and Estonians—with amber began in Neolithic times when Stone Age shamans carved small and curious amber figures with expressionless faces.

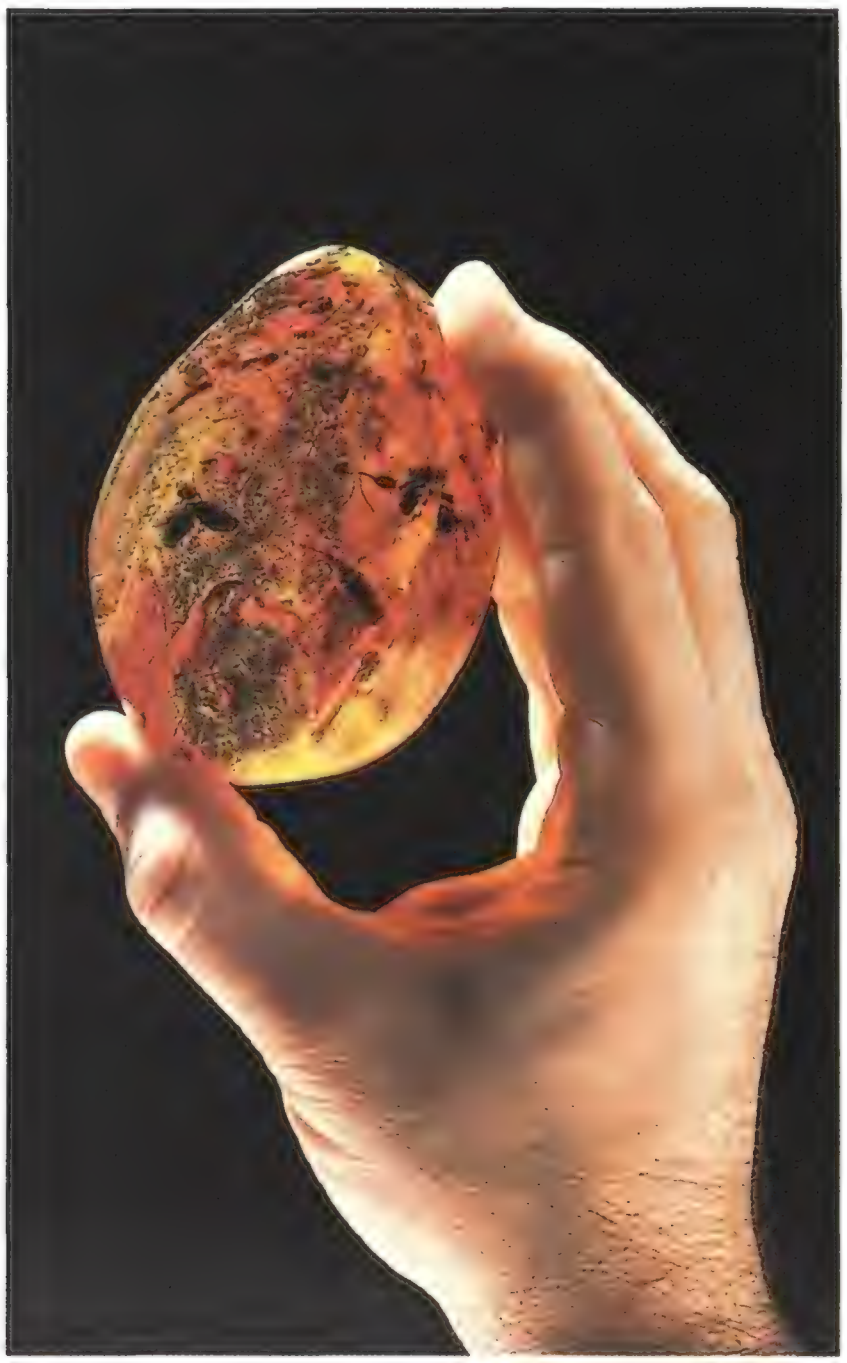
Amber opens the north to Roman trade

Much later, Roman warriors wore mail studded with amber for luck. Such was amber's worth in Nero's Rome that a small piece was valued more than a living slave, reported Pliny in his *Natural History*. This keen observer, who was the first to guess at the true origin of amber, also described how Nero, angered at paying high prices to middlemen for amber, dispatched an emissary and a considerable entourage to travel north through unknown territory and establish contact with the Germanic tribes near the source. The emissary returned with 13,000 pounds of amber, including one

Metalmark butterfly, still showing something of its color patterns, is inside this three-inch piece of amber.

Wealth of Baltic amber may indicate diseased trees fighting back or simply ideal subtropical conditions.

Collector Edith Block's fist-size piece of amber from Dominican Republic trove holds rare feather.



Held to the light, polished amber reveals an ancient cache of leaflets and bark from a vanished forest.

piece that weighed ten pounds. Thus, the hunger for this organic jewel opened direct trade between Rome and the north.

The amber trade dwindled during the early Middle Ages, but in the 14th century guilds that controlled distribution and employed artists to create amber artworks emerged in Belgium and around the Baltic Sea. The culmination of centuries of artistry was not to come until the turn of the 18th century, however, with the creation of the Amber Room, a chamber whose walls were entirely covered in a jigsaw puzzle of a hundred thousand perfectly aligned, intricately carved pieces of amber (pp. 34-35).

The disappearance of this room 50 years ago remains one of the single greatest unsolved art thefts of the 20th century. A gift of the Prussian king Frederick William I to Russian czar Peter the Great in the early 1700s, the room was embellished by Peter's descendants, then stolen back by the Nazis in World War II. It has been missing ever since.

No one knows more about this room than Russian architect and restoration expert Alexander Kedrinsky, who has spent the past decade with a group of compatriots in a grand effort to re-create the lost Amber Room. His office in Catherine the Great's palace in Pushkin, formerly known as Tsarskoye-Selo, is an easy half-hour's drive outside St. Petersburg. Amid a clutter of scrollwork, plaster sculptures and ornate holdings, Kedrinsky speaks of the master craftsmen of the 18th century who worked on the room—Rastrelli, Schlüter, Wolfram—as if he had worked alongside them. In a way, he has. He and his associates have patiently redrawn each panel with excruciating detail, and they know intimately the styles of the many hands that worked the amber panels.

Prussian soldiers comb the beaches

Gottfried Wolfram and the French jeweler Tusso, under the direction of architect Andreas Schlüter jr., built the first incarnation of the Amber Room for Frederick William I's father, Prussian king Frederick I, between 1701 and 1709.

The master artisans chose pieces of amber from the king's vast collection, gathered for centuries along the Baltic coast by special details of soldiers. Wave action on the beach eroded the coastal sediments, revealing amber-rich layers of earth. Because it floats in salt water, amber washes up on the beach, especially after storms. Often, it is trapped in seaweed.

The artisans polished these pieces, sometimes heating them to change the color, and cut them to form interlocking pieces. Individual pieces were carved to form mosaics of exquisite floral scrollwork, busts and heraldic symbols. Like a huge jigsaw puzzle, the pieces

were glued to large pieces of wood, which, in turn, were mounted on the wall. Each panel included a relief of the Prussian coat of arms, a crowned eagle in profile.

King Frederick William I, reputedly disgusted with his father's taste for such opulence, made a gift of the panels to Peter the Great. He hoped to cement an alliance between Prussia and the up-and-coming nation of Russia. Peter, himself disdainful of extravagant wealth and more interested in building the Russian Navy, ignored the boxes of amber paneling. The Amber Room's second incarnation began during the 1740s, when Peter's daughter, Empress Elizabeth, directed the famous Italian architect Bartolomeo Rastrelli to expand the room so that it would fit into the palace at Tsarskoye-Selo. The dimensions of the grand palace, with its 30-foot-high walls, were far larger than that of the original amber chamber's 16-foot-high walls. So Rastrelli framed each of the original panels in a cartouche of gilded boiserie, added 24 mirrors and placed Florentine mosaics in the center of each panel. The ceiling was painted by Fontebasso, the floors laid in an exquisite wood parquet. The Prussian king even sent another panel, this one with a bas-relief of the two-headed eagle of the Russian czars, to help finish the room. Here the room stayed until World War II.

Few in Russia were prepared for the speed and boldness of the Nazi attack on Leningrad in September 1941. The curators at the palace were no exception: they were able only to slap a layer of wallpaper over the amber panels. This didn't fool the Nazis, who stripped off the wallpaper, packed the panels into crates, and sent them west by truck convoy and train to a Baltic seaport from which they disappeared on the eve of the Allied victory.

All that remains of the Amber Room is one color photograph, several black-and-whites, some pieces of amber panel, a few drawings and some notes. With these meager clues and an abundance of resourcefulness, the team tackles the restoration project, a job they believe requires as many as 100,000 individual pieces of amber. Under stereoscopes, they line up black-and-white photographs in an attempt to tease out the relief of the intricate carvings. They've even tried photogrammetry, a technique often used for cartographic mapping. Black-and-white photographs are scanned by a computer that reads the tiny differences between the subtle shades of gray. Thus they can determine, down to a fraction of a millimeter, the precise relief of a man's nose, forehead and chin—all not more than several inches square.

Master craftsman Alexander Zhuravljov talks about

John F. Ross writes on science and history from his home in Chevy Chase, Maryland. His portrait of the sculptor Harriet Hosmer appeared last February.

The only surviving color photograph shows how Amber Room looked in the Catherine Palace in 1930.

how amber breaks as easily as glass. On a table cluttered with toothpick-size instruments, I look at a piece under a microscope. Hundreds of tiny scratch marks form the shape of a crane. These designs are carved from the reverse side, so the image filters through. Gold foil, placed underneath, further sets off the design.

The maps and drawings they've completed are exhaustive, though color remains a real problem. For all their work over the years, only about 40 percent of the project has been completed. Zhuravljov admits over a cup of black Russian tea that the project is far more difficult than he ever imagined. He even hints he might not have begun such a project knowing what he knows now. It's not their commitment but the availability of amber that may doom their project. For the past year, the price of amber from the Palmnicken works on the Baltic coast has soared, as jewelry-grade amber adjusts to the demands of the open market. Already, the artisans have learned to convert their considerable skills to cash: Zhuravljov pulls out an exquisitely inlaid amber box (p. 38) and asks me if I'm interested. It costs $18,000. I pass.

The original Amber Room was last seen in the city of Königsberg, a two-day drive to the southwest of St. Petersburg, where it and other stolen art were on display during the war. Home of the philosopher Immanuel Kant and once the northernmost part of

Today, the inlaid floor and gilded friezes (above) are restored in that same room—but still there is no amber.

If they had not been stolen, the panels would have been destroyed during the siege of what was Leningrad.

Alexander Kedrinksy, the architect who began the restoration, compares mock-up to source photograph.

Surrounded by works-in-progress, craftsmen check the details. Panel in the foreground is near completion.

Treasured amber preserves treasures

East Prussia, Königsberg lies on the Baltic Sea, tucked between Poland and Lithuania. In two days in August 1944, RAF bombs leveled the downtown area including the king's castle, where the art was displayed. After the war, the area fell to the Soviets, who bulldozed the rubble, established a new street layout, erected bland Communist buildings, and renamed the city and surrounding province Kaliningrad.

No remains of the Amber Room were found in the rubble of the castle, leading most to believe that the Nazis evacuated the art before the raids. But to where? The war consumed whatever solid clues, such as documents, that might point the way to the lost room. Recollections of many residents are marred by time.

Seemingly, everyone around the Baltic has an opinion on the room's whereabouts. Some say the crates made their way aboard a submarine that was later sunk by Allied aircraft. Or, they were placed on board a ship and transported to East Germany or Argentina. One of the last German ships to leave Königsberg, the *Wilhelm Gustloff*, packed with civilians, was torpedoed and sunk. Divers found only bodies. Yet another theory holds that the room is in the hands of an American collector.

On the strength of the Nazis' efficiency, many believe that it's hidden somewhere in the former East Germany. Even Boris Yeltsin recently got caught up in the excitement, telling the Germans that it was hidden in their country. Possibly, the Amber Room is secreted in the mine shafts of Ohrdruf in the southwest corner of eastern Germany or in the labyrinth of bunkers below Weimar.

In their searches for this elusive treasure, some have died falling down mine shafts, while others have been blown up by old armaments. A small army of art detectives, spurred by thoughts of glory, has dredged lakes, unearthed graves, dug holes, uncovered cellars—all to no avail. The former East German Ministry of State Security, the feared secret police known as the Stasi, spent years and millions of dollars in an unsuccessful quest for the lost treasure.

Most Kaliningrad residents believe it never left the immediate area; there's no concrete evidence that it ever did. Ask a curbside group of young men: they'll smile and offer to take you to the hiding place for a price, usually in the vicinity of a million dollars. An old man told me he would talk because his time was coming. Another man, who I later discovered worked for the secret police, laboriously told me about his search efforts through nonscientific techniques—basically "divining" for the treasure.

Valery Birjukov, the bureau chief in Kaliningrad for the press agency Tass, has written a book on the searches and believes, too, that the room never left Kaliningrad. He heads a small group of dedicated amateurs who spend free weekends on digs. A short, lithe man with bright blue eyes and a cut-to-the-quick honesty, he takes me to the spot where he believes it's hidden, a brewery in the district of Ponart, on the outskirts of Kaliningrad.

With the wave of a hand he dismisses charges that the room was destroyed. "The Nazis were too good at

At Palmnicken mine, a water cannon blasts blue clay containing amber into a slurry for processing plant.

Illegal gleaners known as "crows" search for amber. Baltic Sea is just beyond the dike in background.

packing up art to let this one go," he says. "Even Hitler wanted it." He believes, however, that they had no time to remove it before the ring of hostile forces enclosed them.

Birjukov's idea hinges on the beer-drinking habits of a key player: Gauleiter Erich Koch, a Königsberg-born Prussian, was in charge of the room in those last few weeks before the Red Army broke through German defenses. According to Birjukov, Koch spent much of his free time drinking beer at the brewhouse overlooking Swan Lake in Ponart, once the source of the ice that served to cool barrels of beer in an underground room. Birjukov feels sure that Koch knew about the ice room, though it had not been used since 1912, and directed his drivers to place the amber panels there. Today no one knows where the ice room was.

After the war, Koch was apprehended and questioned. Paradoxically, it was his supposed knowledge of the whereabouts of the room that kept him alive—so he never told and remained imprisoned for the rest of his long life. Yet, there were strange clues. In 1967, on a return trip to Königsberg under guard, Koch, then an old man, told searchers that the crates were hidden underground near a Roman Catholic church.

"There are no Roman Catholic churches in Königsberg," Birjukov says, "and Koch knew the history of the area very well." But, at Ponart, next to the brewery, is the site of a 13th-century Teutonic castle. "This was before the Reformation," he speculates, "so they were Roman Catholic then, and probably had a church in the castle." He supports the rest of his argument with a mix of passion and stories of strange convoys of trucks that were seen by brewery workers. He can't explain, however, why Koch did not finally give up and tell all after so many years of captivity.

Today, the brewery has been transformed into a mineral water plant. A motley line of Russians assemble in front of the gate, each holding containers. Across the street, we poke our heads into the opening of an underground passageway. The dark tunnel does not beckon; it smells of ancient rot and motor oil. Despite this, I begin to head inside. Birjukov stops me with a firm hand.

"There are many dangers," he says. "In here, last year, we knocked down a brick wall blocking a passage, and a torrent of motor oil and water came rushing out up to our armpits, nearly drowning us." This I learned was only one of the dangers of searching this area. Another problem was the possibility of encountering live armaments. In an attempt to locate the where-

Inlaid box, made from amber scrap when supplies for the restoration dried up, was priced at $18,000.

abouts of the ice room, Birjukov and his band of weekend treasure seekers drill holes into the ground of the brewery. The possibility of running into an electric cable—the electrical plans have all been lost—and a difficult boss of the mineral water plant make for slow going.

Not far from Kaliningrad is a group of large amber-producing mines, near the town of Palmnicken. For reasons that still elude geologists, the amber deposits here are the richest in the world. Each year the Russians pull about 700 tons of amber from the earth. Scientists speculate that some 30 million years ago, forests covered the region known as Fennoscandia. The climate then was subtropical, more like that of southern China, Laos and Vietnam today. Great broadleaf conifers interspersed with hardwoods formed vast forests. Those trees wept resins.

Ancient conifers probably exuded resins as a foil against the insects that threatened them. The relatively new field of chemical ecology supports this, citing modern-day examples of the lodgepole and Ponderosa pines in the Western United States, trees that fight pine beetles with terpene-laden resins.

Pieces of amber from the forest washed down large rivers, traveling for many miles in a southwesterly direction. In the vicinity of the Sambia Peninsula on the Baltic coast, the current probably slowed as the river grew shallow and sluggish. Amber dropped to the bottom, where succeeding sediments covered it. Because amber has been washed out of context, geologists haggle over its exact antiquity, although they all seem comfortable with an age between 27 million and 48 million years ago. When the ice ages came, glaciers further ground away any clues.

At the Palmnicken amber works, the amber-rich layers lie in a bed 120 feet below the surface. The so-called blue earth, colored by glauconite, is rich and dark—contrasting with the Baltic's sandy and wind-swept beaches. As much as 7.7 pounds of amber can be found in each cubic yard of earth—enough to stick in a hand and easily pull out a piece.

A high dam of sand and soil separates the huge strip mine from the sea. Cranes with shovels the size of a dump-truck bed pile the blue earth into small mountains. Water cannon blast them, reducing the earth to thick slurry in a matter of hours. Pipes transport the slurry for a quarter-mile to the processing plant, where screens and suspension pools isolate amber from stones, pieces of trees and other materials. Of the amber collected, only about 13 percent is suitable for jewelry. The other pieces are sold for use in varnishes, paint thinners, polishes, fuel additives and medicinals. The perimeter of the mines is strung with concertina wire. Young soldiers with Kalashnikov assault rifles guard the rich deposits. Off in the distance, black marketeers search recently abandoned pits. Locals know them as "crows," because they resemble the quick-billed scavengers that search recently plowed soil for worms. A local paper reported a story of an enterprising boy whose diligence at prospecting for amber netted him some 200,000 rubles over his summer vacation. Not bad in a country where the average yearly salary is a great deal less.

Oldest amber comes from USA and England

While amber from the Baltic area is best known, and some purists argue that it's the only true amber because of its characteristically high succinic acid content, amber is found all over the world in deposits ranging in age from the late Carboniferous (300 million years ago) to the Pleistocene (1.5 million). On the East Coast of the United States alone, there are 24 known amber localities. The world's oldest amber comes from the central Appalachian region of the United States and from Northumberland in England. Amber also comes from Israel, Jordan, Lebanon and Austria (early Cretaceous); Manitoba in Canada, the former Czechoslovakia, Alaska and the Atlantic Seaboard (late Cretaceous); the Baltic (Oligocene); Mexico and the Dominican Republic (Oligocene and Miocene); and Ecuador and Colombia (Tertiary).

Though the Baltic area has the richest deposits in terms of quantity, the most exciting amber today, from a scientific perspective, comes from the Dominican

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In scene from the film *Jurassic Park*, coming in June, miner offers a bloodsucking insect encased in amber.

Republic. Only recently exploited on a large scale, Dominican amber surprises scientists with its large number of inclusions. The Smithsonian Institution owns a 5,000-piece collection that contains, according to curator Don Davis, some 10,000 insects representing 20 different orders.

Where the Baltic amber averages one insect inclusion per 1,000 pieces, Dominican amber contains one in 100. One explanation is that the Oligocene-Miocene climate of the Dominican Republic was more tropical, and supported a wider variety and greater number of insect species. Yet another hypothesis suggests that resins in Baltic trees were mainly restricted to interior ducts, while Dominican trees exuded resins outside their bark.

The Stuttgart Natural History Museum houses one of the best collections of included Dominican amber in the world, put together by entomologist and amber expert Dieter Schlee. He shows me his best pieces. A 1½-by-2-inch piece of amber contains at least 2,000 ants (see cover). Beautifully preserved, a mayfly and a dragonfly indicate that water sources, such as ponds, existed in the forests. I look at water beetles, midges with parasitic nematodes and a praying mantis. I see amber with thorns, pieces of wood, flowers, seeds, leaves. A beetle gleams, its shiny green shell as pretty as a party dress.

In another piece, tiny spiders emerge from a fluffy white cocoon. Nearby, tiny threads connect the mother's legs to the cocoon. Schlee wonders why this small hopping spider did not leave before the amber hardened. On the evolutionary scale of things, such cocoonery is rather advanced because several different types of web material are required. The find sets a minimum date for this behavior, much older than previously thought.

Of particular interest to Schlee is his collection of termites. With special care, he points out a highly developed social order. Here's a nose soldier: an eyeless creature with no mandibles, which must be fed. Its warlike pointed proboscis spews out a sticky glue that debilitates ants and other termite enemies. Other soldiers boast powerful mandibles with which they squeeze enemies to death. No other fossil record exists of such diversity so early.

After poring through these pieces, one begins to get a sense of a larger whole. "It begins to be possible to reconstruct the ecology of an amber forest," says Schlee. Whereas other fossils, particularly from subtropical and tropical climes, are not representative or in good enough condition, amber supplies unusual opportunities. The fact that insects are together in a piece of amber pretty much guarantees that they come from the same spot, trapped within weeks, days or even hours of one another.

Most of all, other types of fossils don't contain recoverable pieces of DNA, but amber does. David Grimaldi, of the American Museum of Natural History, and a group of biochemists have isolated and identified 30-million-year-old DNA from the crumbly remains of a termite in amber. Though *Mastotermes electrodominicus* is now extinct, a relative plagues northern Australia. The finds, published in *Science*, push the oldest isolated DNA—formerly from a magnolia leaf 17 million years old—back nearly 13 million years.

Better preserved than in human mummies

It all started when University of California biologist George Poinar announced with his colleague Roberta Hess that, using an electron microscope, they had discerned cell organelles in the abdominal tissue of a 40-million-year-old fungus gnat. Ribosomes, mitochondria and cell membranes were visible. In fact, cell nuclei were better preserved than those in much more recently preserved human mummies. Poinar and his colleagues went on to be the first to report the isolation and identification of DNA from amber fossils, those of extinct bees. They published their results in the British journal *Medical Science Research.*

Because the pieces are so small, it's tricky work to avoid contamination. The DNA found in the residue from a fingerprint is far more than enough to taint any findings. To protect against this, the American Museum group compared the sequenced DNA with DNA from living termites for similarities. It matches, with some unique features.

Grimaldi insists that the importance of this find lies in phylogenetics—tracing lineages through genetic links. He believes, for instance, that the recovered DNA has changed the way scientists read the family tree of termites and cockroaches, clarifying disputed points about their shared ancestry.

Inevitably, however, the conversation moves toward re-creating extinct life. "You've got to realize," he says, "that we isolated only 200 base pairs." Even bacteria have nearly 10 million base pairs, and a human has more like 6 billion. "Anyway," he adds, "there are too many gene switches and developmental anomalies to make it work." Yet he acknowledges that the next step is to examine inclusions in Cretaceous amber, formed when dinosaurs roamed the planet.

George Poinar and California Polytechnic biochemist Raúl Cano are more optimistic, though guardedly so. They acknowledge that even if a complete genome is identified, it's not been possible so far to clone an animal from this information. Yet, theoretically it can be done. Cano compares bringing back a dinosaur to reassembling a photograph of the pure blue sky that has been cut into a million pieces. "No one has seen what dinosaur DNA looks like," he says. If they do isolate red cells from the throat of an insect that had bitten a vertebrate from the Cretaceous, it would be tough to know whether they are from a dinosaur, another kind of reptile, or a bird or amphibian. But still, he insists, "it's theoretically possible down the line."

Even in the face of scientific realities, it's intriguing to imagine what other kinds of genetic material could emerge from the ancient yellow vaults of amber. Who knows, in an amber-entrapped mosquito, scientists may find some long-lost hominid blood.

Scientists are looking beyond amber in the accelerating search for the oldest extant DNA. Brian Farrell at the University of Colorado has reported preliminary positive results with 200-million-year-old fish fossils. Noreen Tuross at the Smithsonian could double that with DNA from marine shellfish dating back 400 million years. But amber will always be special, for the way it so perfectly preserves delicate organisms, and for its own intrinsic beauty. It is not for nothing that we use it for jewelry.

Pieces of the Smithsonian's collection of amber from the Dominican Republic; all contain insects.

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By Frances Maclean

'They didn't speak our language; we didn't speak theirs'

For nearly two decades the U.S. Marines ran Haiti 'for its own good.' But most of whatever good was done did not last

Dramatic moment depicted in this Marine Corps painting shows 1915 capture of a rebel fort in Haiti.

Just after midnight on July 26, 1915, two Haitians, one living in asylum at the French Legation, the other at the Portuguese, quietly closed the doors to their sanctuaries and slipped into the Port-au-Prince night.

Like many of their countrymen, they were veteran intriguers. They trusted the dark to hide them, and they counted on the denseness of the tropical air to muffle the sound of their movements and that of 52 mercenaries whom they would meet in a nearby ravine.

Once assembled, the guerrillas shouldered their rifles and followed their leaders to the city center. There they knelt in the darkness, took aim at the looming shape of the president's mansion and fired off round after round.

Inside, President Vilbrun Guillaume Sam, Haiti's seventh president in seven years, waited with his family and attendants until dawn. Slightly wounded but with a gun in one hand, Sam and entourage bolted for the French Consulate next door.

In Port-au-Prince, everyone knew that sustained gunfire meant a change of government; guards had orders to kill all political prisoners. That day 168 members of the country's elite families were slaughtered, and the streets were filled with mobs screaming for Sam's blood.

The next day, relatives of the massacred prisoners surrounded the barricaded consulate, calling for President Sam's death. Finally at dawn, July 28, in a wave of rage, an 80-man murder party scrambled over the garden wall. They swarmed through the building, searching behind doors, under beds, in cupboards. A medicinal odor from Sam's dressed wound led them to his hiding place, an alcove concealed by the ambassador's stately bed.

Someone stabbed the president. Another grabbed his heels and dragged him downstairs. Another heaved him over a veranda railing to the courtyard below, where the crowd shoved and pummeled one another to get at him. Sam gripped the spokes of a diplomat's carriage until a whack broke his wrist. As he staggered to the front gate, his skull was split open with a blow from a *cocomacaque*, the heavy stick made of coconut palm often carried by Haitians. The U.S. chargé

Smedley D. Butler Hall, Quantico

At center, Maj. Smedley Butler; his men surprised *caco* guerrillas by scrambling through a long tunnel. Marines were unscathed, 51 *cacos* died, Butler got a medal. But the raid later drew criticism in Congress.

d'affaires reported: ". . . a man . . . rushed howling by me, with a severed hand from which the blood was dripping, the thumb of which he had stuck in his mouth."

Meanwhile, aboard the U.S. Navy ship *Washington*, which lay in tranquil waters a mile offshore, radiograms flew back and forth to Washington. At about 6 P.M. on July 28, 1915, Adm. William Caperton had his orders. He loaded 330 marines and sailors into boats and went ashore to restore order. The marines stayed 19 years.

According to Robert and Nancy Heinl, authors of the Haitian history *Written in Blood*, two marines died that day, apparently shot by their own weapons, and one Haitian, as he single-handedly defended Fort National. Most Haitians complied as the marines seized arms and took over public operations. The 1915 invasion surprised neither Haiti, which shares the Caribbean island of Hispaniola with the Dominican Republic, nor the rest of the world. For a decade U.S. ships as well as those of other foreign nations had patrolled Haitian waters, to protect their nationals and monitor a succession of mostly bloody revolutions on the island. "In the beginning we were glad to see the marines," Franck Henriques, a Haitian teacher, would recall.

The first President of Haiti under the occupation was Philippe Dartiguenave, here flanked by Marine officers. A lawyer and a leader of the Haitian senate, in 1915 he was the candidate most willing to cooperate with proposed U.S. policies. At the time, Haiti's presidents were often murdered or driven violently from office.

In the 72-year period before the invasion, Haiti had had 102 civil wars, revolutions, insurrections, revolts and coups. Of 22 presidents, just one served a complete term. Only four died of natural causes. Thirteen were ousted by coup. One was blown to smithereens by an explosion in the palace. One was deposed, then executed. One was torn to bits in the streets. Despite the gore, running for president in Haiti had a certain etiquette. Candidates (with someone else's money) assembled armies of *cacos*, part-time guerrilla fighters recruited from peasant villages in the mountains. (In the elusive Creole patois spoken by Haitians, *caco* is variously translated as "mean red ant" and "bird of prey.") The brigades then marched to Port-au-Prince to kill the current president. First attempts were not always successful, so second or third tries were common.

Today the takeover of another country is frowned upon. And it is true that at the time the United States favored something called Dollar Diplomacy, the use of investment and trade to further American influence abroad, as well as to encourage order and prosperity in politically unstable countries. But forcible meddling where American interests were involved was still looked upon as more or less legitimate.

In the early 20th century, many Caribbean and Central American countries were heavily in debt to European countries and still shakily trying to make it as independent nations. Political upheavals were common. Sometimes during riots or revolutions, or after a foreign debt went unpaid, U.S. marines were sent in to establish order. Customhouses, generally the main source of revenue, were often seized. Then the United States used the export-import duties collected there—augmented with revenues from bonds sold in the United States—to pay off the foreign loans. This brought a measure of honesty and order out of fiscal chaos but tended to assure the countries' future indebtedness to U.S. bankers and businessmen.

In doing so, the United States was following the "Roosevelt Corollary," Teddy Roosevelt's update of the Monroe Doctrine, which required European countries to keep their distance. TR declared in 1904 that the United States alone had the right to police the turbulent little countries of the Western Hemisphere, to protect property, maintain order and make sure they paid their debts. By 1915 we had intervened in Colombia to create Panama for a future canal (1903) and in Cuba (1906). Marines had landed in Honduras (1907), Nicaragua (1910, 1912) and Mexico (1914). They would take over in the Dominican Republic from 1916 to 1924.

Despite its political upheavals, Haiti was very much a special case. Haitian presidents, who had access to its customs receipts, had borrowed unwisely. In 1915, with

a debt of $21.5 million—so large that 80 percent of its budget went to debt service—Haiti was one of the poorest countries in the Western Hemisphere. Also one of the proudest. In 1804 a heroic and successful war with France had made Haiti the world's first black republic—and history's only example of a successful slave rebellion. The high cost of expelling a foreign master remained a vivid historic memory. Come coup or countercoup, come graft or corruption, Haiti, unlike most Caribbean or Central American countries, never defaulted on its foreign debt payments.

In the years leading up to World War I, the little country also stoutly resisted all financial pressures, bribes, blandishments and dirty tricks calculated to get it to go into receivership and let Uncle Sam put Haitian fiscal affairs in order. A chief instigator was American banker Roger Farnham, an officer of the National City Bank of New York, president of the National Bank of Haiti and vice president of one of Haiti's railroads. He had decided that his financial future in Haiti, as well as the country's stability, would depend on a U.S. takeover and he steadily exaggerated the extent of German holdings and influence there. Farnham became a leading adviser to Democratic President Woodrow Wilson's Secretary of State, William Jennings Bryan, who was no expert on Haitian affairs. ("Dear me! Think of it. Niggers speaking French," Bryan marveled during an early briefing.)

Ship traffic through the Panama Canal began in August 1914, within days after World War I broke out. The pressure on Haiti, as well as strategic concerns, mounted. In February 1915, the German government announced unlimited submarine warfare against neutral ships carrying cargo to its enemies Britain and France. In May 1915, the *Lusitania* was sunk. About 1,200 drowned, including 128 Americans. Encouraged by Farnham, the already exaggerated fears about possible German acquisition of a base in Haiti escalated dramatically. Plans to intervene had been ready for some time. The Haitian bloodbath of July 26 provided the right moment and a justifiable excuse to intervene.

What the marines first noted was that in the land Christopher Columbus had called a paradise, everything was in shambles. "In the street were piles of evil-smelling offal . . . the whole prospect was filthy," one wrote. Telephone and telegraph lines had been inoperable since 1911. Railroad tracks were sporadic and shaky. Lighthouses were lit with kerosene lanterns.

Second-occupation president Louis Borno, who took office in 1922, presents medals to Haitian noncoms of the new Gendarmerie, a national police force recruited, trained and officered by marines. It was to be a peacekeeping force, discouraging banditry and *caco* insurgencies. An ex-minister of finance and foreign affairs, Borno much admired Mussolini.

This photograph of *caco* leader Charlemagne Peralte, shot by marines in 1919, made him a Haitian martyr.

Designated rocks and chunks of iron served as weights in the customhouses. Bridges were down. Holes gaped in the prison walls. Mattresses and pillows covered doors and windows to absorb stray bullets.

More immediate and distressing, the *cacos* soon cut off the mountain paths used by peasants bringing food to coastal towns and city markets. Many of the country's 1.5 million people were hungry. President Wilson was worried about whether the United States had "the legal authority to do what apparently we ought to do." In the end, the Administration had the marines do what they were trained to do. They took over. Food and medical centers were set up, and remained for much of the occupation. Then the Navy commander took over the country's purse strings, meaning, essentially, Haiti's ten customhouses. Navy paymasters became collectors of customs.

First bivouacking in tents around Port-au-Prince, the relative handful of marines (there never were more than 2,500 at a time in Haiti, and usually far less) soon branched out around the country and built more comfortable thatched-roof mud-and-wattle huts, often with the added luxury of poured concrete floors. They brought cars, trucks and even airplanes to Haiti.

A Marine Corps officer was placed in charge of each district with instructions to keep order, collect taxes, arbitrate disputes and even distribute medicines. The enlisted men tended to be monolingual, often with less than a high school education. Most had been brought up to think Africans inferior. Suddenly they found themselves confronted with a black society that had an upper class better educated and more sophisticated than they, and an intensely proud, though uneducated, peasant class. Nonetheless, Haitian Daniel Beaulieu, a 77-year-old radiologist, has fond memories of some of the foreign invaders. "The Marine station was across the street from our house in Jacmel. I was just a baby. In the evenings they came over and sat on my porch. They rocked me and sang to me. Sometimes they took me for a walk."

Picking a candidate for president

Nevertheless, strong antioccupation feelings inevitably set in—except among rich and favored mulattoes who hoped the Americans would turn the country over to them. Haitian presidents were officially "elected" by the members of the legislature, whose votes could often be bought, and were swiftly swayed by the presence of victorious revolutionaries. Charmed by the educated, more pliable upper class, U.S. officials now arranged for the election of Philippe Sudre Dartiguenave, a mulatto, as Haitian president to succeed Sam. He was the only candidate who had agreed to the American plans for restoring political and financial order in the

Davenport Museum of Art, Iowa

Haitian Philome Obin depicted a fight between *cacos* and marines two months after the occupation began.

troubled country. But making him president proved to be a major mistake.

To a large extent Haitian politics had been a long struggle, still going on today, between blacks and mulattoes, a class that resulted from colonial liaisons between French men and Haitian women. Black mistresses were, at times, acknowledged, and their children were usually well educated, sometimes in France. And sometimes they inherited property. Culturally, they considered themselves French, not African. Inevitably, members of the mulatto class were looked down on by their French relations and hated by their envious African kin. In Haiti they gradually acquired much influence through wealth, and devised a social and economic hierarchy based on skin color, lighter being better. In the minds of the black majority, the choice of a mulatto as president permanently aligned the Americans with the blacks' oppressors. President Dartiguenave was a lawyer who had been a leader in the senate, but before long much of the population disliked him so intensely that he had to go everywhere, and even sleep, guarded by marines.

At the time and later, though the marines made life in Haiti tenable with food and eventually health care, anti-American feeling grew. Martial law was imposed on September 3, 1915. Haitians sandwiched life's chores between curfews. The United States censored criticism in the press and tried political offenders in military courts. In sorties from their mountain dens, a resistance movement of *cacos* began ambushing marines day and night. Hoping to end the skirmishing, Admiral Caperton agreed to dispatch more marines. Violence only escalated. His men "hunted the *cacos* like pigs," wrote Maj. Smedley Butler, the diminutive, war-loving son of a Quaker Congressman from Pennsylvania, who had commanded a Marine battalion in Veracruz in 1914 (SMITHSONIAN, June 1984).

Quite apart from the dangers, it was trying duty for marines in the countryside. In a memoir written later,

*Frances Maclean last wrote about Haiti's black king Henry Christophe (*SMITHSONIAN, *October 1987).*

Haiti's influential elite class, largely mulatto, emulated the French, discriminating against their darker-skinned countrymen, and disdaining their African heritage. Though the elites made up less than 4 percent of the population, the power struggle between the two factions is a leitmotif in Haitian history.

former Pvt. Homer Overley of Monon, Indiana, would list the rigors of patrolling the mountain bush: " 'Spic' itch, rotting feet, malaria and black water fever, and 87% civilian venereal disease factor, elephantiasis and small pox epidemics, lamp-burning Clarine as poor man's booze, dirty water, too little food. . . ." According to Overley there had been three local instances of mutilation of marines by *cacos*. Other atrocities were rumored, including some by marines.

To maintain at least the forms of diplomacy between two nations, President Wilson called for a formal treaty. Drafted without any Haitian consultation, the treaty was signed in October 1915, making Haiti a virtual U.S. protectorate. It called for American control of the country for ten years, established a U.S. financial adviser to the Haitian government and a national police force officered by Americans. Most important, it gave America control of Haiti's debt.

With the treaty in train, Admiral Caperton sailed home. He had respected and even entertained Haitians. The elite referred to him as *le beau vieillard svelte*, "the handsome, graceful old man." His replacement, Littleton W.T. Waller from Virginia, was quite a different sort. "There are some very fine looking, well educated polished men here," Waller wrote a friend, "but they are real nigs beneath the surface. What the people of Norfolk and Portsmouth would say if they saw me bowing and scraping to these coons—I do not know." Pre-World War I America crackled with racial prejudice. Inevitably, marines brought their biases to Haiti. In return, Haitians criticized the marines, less often for racism than for lack of culture: the Americans had no manners, they claimed, and did not speak French.

Smedley Butler, who later referred to his marines and himself as "a glorified bill collecting agency" for American business, held divided sympathies with regard to race, or rather, class. He had a strong paternal feeling toward "those who did not wear shoes," meaning the vast majority of black Haitians, and a terrible contempt for the well-to-do. He was concerned about the welfare and training of the peasant recruits for his Gendarmerie, a national police force that he set up to end the cycle of Haiti's revolutionary bloodshed. Butler's rudeness toward the mulatto elite, who considered service in the Gendarmerie beneath them, was legendary. On a trip with Dartiguenave, Butler claimed that he made the president sleep on the floor while he occupied the only bed in a room they shared.

History also credits Butler with reactivating a harsh Haitian labor practice, the corvée, similar to the one used by independent Haiti's reformist black king, Henry Christophe, in order to help build new roads. Under Butler's command, members of the Gendarmerie sometimes marched the conscripted corvée road gangs to and from sites, roped together like prisoners. When cries of slavery stirred in the press in 1918, Washington officially stopped the corvées, though the system persisted for a few more months in the backcountry, where *caco* guerrilla activity was hottest.

It wasn't long before these resistance fighters became folk heroes in Haiti. Charlemagne Peralte, a charismatic, educated black, emerged as their leader. As Peralte's legend grew, the marines grew more and more determined to get him. Eventually, after months of spying, a marine-led Gendarmerie patrol snaked over mountain trails at night into Peralte's camp. A marine shot him twice. Needing proof of his death to demoralize the *cacos*, the marines propped Peralte's

body against a board, unwittingly posing him with arms hanging limp and head slumped to one side as if crucified. A photograph of it circulated throughout the country, assuring Peralte's place in Haitian martyrdom.

The surrender of Germany, in November 1918, eliminated the strategic reason for the marines being in Haiti. Most of them, who would rather have fought in Europe anyway, had begun to lose their sense of purpose: "We . . . tried to keep Esprit du Corps high," Private Overley wrote, "but we sometimes wondered . . . if our flag wasn't being dragged through the slime of Imperialism." Sgt. Faustin Wirkus of Dupont, Pennsylvania, came to believe that kind treatment and understanding might avert the "spirit of rebellion among the country people—which might save a lot of fighting and killing and get Haiti on its feet."

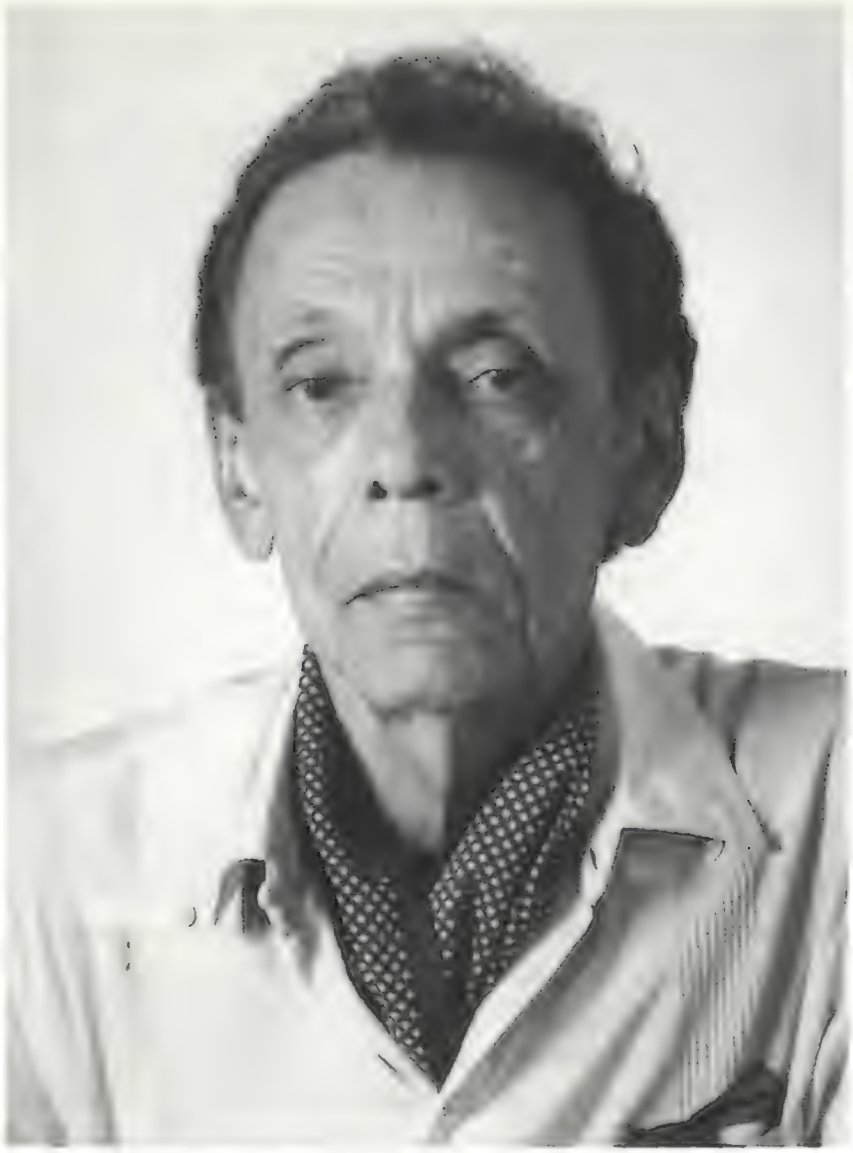
By 1920, Republican Warren Harding campaigned for the Presidency partly by denouncing the Democratic Administration's occupation of Haiti. Democrats, particularly Franklin D. Roosevelt, were attacked for imposing a constitution on Haiti "at the point of bayonets." As Wilson's Undersecretary of the Navy, Roosevelt had visited Haiti and liked to claim he had drafted Haiti's constitution. In 1921 and 1922, testimony in Senate hearings on the issue painted a grim picture of brutality, mismanagement and racism. In the first five years, it was estimated, 2,250 Haitians, including some of the Gendarmerie, had been killed, as against 14 to 16 marines. But the United States did not want Haiti to return to political and economic chaos—nor did it want to see its stabilizing mission appear a failure in the eyes of the world. The Senate voted to stay on.

We would be staying under different terms, however. The plan was to turn Haiti into "a first-class black man's country," as Major Butler later put it. Haiti was to be pulled up by its bootstraps, becoming a country where Americans could invest. The new program was sometimes called "Occupation Uplift." The treaty of 1915 was extended; a U.S. high commissioner was installed. Haiti's debt was renegotiated—through the National City Bank of New York. In 1922 Dartiguenave stepped down. Louis Borno, who had served as both foreign minister and finance minister, became president.

The United States then began seriously trying to improve conditions and to make Haiti progressive, efficient, technological. Haiti, it was hoped, would become stable and prosperous, buying U.S. goods and supplying us with fruit and vegetables raised by plantation agriculture. "Just because the Haytian native population does not use knives and forks and cups," wrote

Under supervision of a marine, Haitian prisoners make furniture in an open-air workshop in Port-au-Prince.

Haitian children cluster around a friendly American sailor shortly before the occupation ended in 1934.



Architect Albert Mangonès on the Americans: "They didn't speak our language; we didn't speak theirs."

Frankin Roosevelt, who was interested in investing in Haiti, did not mean that they would never do so.

More than 1,000 miles of roads and 210 bridges were built. The 200-year-old French irrigation system was resurrected and expanded. Haiti's telephone system was expanded and updated to link the island's cities. Old wharves were repaired and new ones constructed. Fifteen acetylene lighthouses were built. The barely existent sanitation system was overhauled. Parks were laid out and gardens planted in city centers and at municipal buildings. A number of theaters and schools were restored or built from the ground up. The public health program was expanded. Hospitals and clinics were set up across the country to help control malaria and yaws. American doctors came to train Haitian doctors, and some Haitian doctors eventually went to the States to study. (One of them was François Duvalier, who later became known as "Papa Doc," the country's infamous dictator, 1957-71.) The size of the Gendarmerie was increased in part by "Haitianization"—replacing some of its American officers with Haitians; and in 1928 it was renamed the Garde d'Haiti. The tax system was expanded, as well, to include basic levies on exports and imports. The currency was stabilized by fixing it to the U.S. dollar.

The hope was to advance Haiti in one giant step from a predominantly hoe-wielding culture to a modern agricultural state. On paper, one of the most useful programs was the Service Technique, created to give formal instruction in field-crop production and soil management, as well as in simple technology. Sometimes lecturers came from the United States, a few from schools like Howard University and the Tuskegee Institute, but visiting Americans needed translators, and instruction was slow.

Manual work made them feel "like slaves"

With great enthusiasm and the best of intentions, the Service Technique recruited young men and took them into the fields for training in such things as cattle raising or tobacco growing and veterinary medicine. Some were placed in open-air "shops" where they were taught to operate simple assembly-line machines to stitch boots, for example. Some were elites drawn from the *lycées* (high schools) because they could read, who were paid scholarships to join the program. Americans, who are accustomed to doing their own work, could not have imagined that such training would offend the Haitians. But Haitians, emulating the French cultural upper class, preferred classical French education. Many of the elite (and in U.S. eyes, effete) young men felt degraded working with their hands. They said it made them feel like slaves.

Some farmers gained from the new technology, but too often, at least from the educated Haitians' viewpoint, the program seemed designed to benefit a few large plantations, some owned by American companies. Progress was made in the production of sisal (for cordage) and sugar. But there were, in fact, too few large plantations, partly because much of Haiti was mountainous and remote, partly because Haitian land titles favored small plots and acquiring them to create plantations under Haitian law was costly, complicated and time consuming.

American banks had taken over Haiti's national debt, which had to be serviced. Everything done in Haiti had to be done with what was left over from Haitian funds. During the prosperous '20s, when the world coffee price was high and Haiti's long period of U.S.-enforced stability allowed small businesses to flourish, Haiti's government revenues ranged between $8 million and $10 million a year, almost twice the revenues of just before the occupation. The money went farther, too, since graft and corruption and costly revolutions had been eliminated. But there was never enough money to finance necessary reforms.

Occupation officials had hoped eventually to raise money through a combination of U.S. and international loans and bonds sold on the U.S. market, but were disappointed. Haitian soil turned out not to be as

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PURINA O·N·E SECOND TO NONE

Preparing to depart, marine detail carefully lowers the American flag at Cap-Haïtien on August 15, 1934.

rich as expected. In the end all that Haiti had going for it was cheap labor. U.S. and European investors decided that their money would be more profitably spent elsewhere—including in Haiti's next-door neighbor, the Dominican Republic, which was under U.S. control from 1916 to 1924.

The Dominican Republic had better land for plantation agriculture. In contrast to Haiti, its U.S. administrators had used the country's funds to build hundreds of schools, and they resurveyed land so that legal titles could be easily conveyed. The Haitian government's budget for 1927 shows the occupation's fiscal priorities: $2.68 million for public debt; $1.44 million for public works; $1.28 million for the Gendarmerie; $680,000 for public health; $500,000 for agricultural service; $400,000 for public instruction.

In addition to quarrels over the way Americans were supervising the Haitian budget, there were social frictions. "We thought of Americans as wild cowboys," says Albert Mangonès, a 75-year-old architect and sculptor. "They didn't speak our language; we didn't speak theirs. And we were well aware of the lynchings of American Negroes." Hostile feeling became steadily more intense. By the late 1920s a coherent, elite-based opposition had developed.

Outside events made matters worse too. Coffee was Haiti's main export crop. In 1928 the crop was poor, and the next year saw a drastic drop in the world market price of coffee. That was the year of the stock market crash, ushering in the Great Depression. In response, Haiti's American financial advisers raised Haitian taxes; they were eager to get as much of the U.S. bank loan paid off as fast as possible in case Haiti's economy should collapse totally.

Finally, a massacre stirs worldwide criticism

Inevitably Haitian resentment grew most voluble and incendiary among the handful of university-level students. They formed national unions, joined the infant Caribbean Negritude movement and met with U.S. representatives of the new National Association for the Advancement of Colored People. They demonstrated en masse, sparking local antioccupation newspaper campaigns, which found an echo both in the United States and in anti-American Europe. In October 1929, when it was announced that Service Technique student stipends for fieldwork would be raised, while stipends in the city would be reduced, students stoned the director's house and boycotted the Service Technique's agricultural school in Port-au-Prince. Before long, students all over the country joined in. Finally the clergy, customs officials, storeowners and businessmen stopped working.

If one event symbolizes the failure and collapse of the occupation, it was what became known as the Les Cayes Massacre. On December 6, 1929, a crowd of 1,500 peasants, armed with rocks and clubs, marched through the town of Les Cayes to protest the jailing of demonstrators. When a Haitian protestor started a scuffle with a marine, other marines fired, most of them into the air, but some into the crowd, killing 12 and wounding 23. Or double those numbers, according to outraged Haitian reports.

The killings stirred worldwide criticism of America. President Herbert Hoover, recently elected and trying to launch his Good Neighbor Policy for Latin America and the Caribbean, dispatched a commission to Haiti. Its job: to decide "when and how we are to withdraw." Once back in Washington, Hoover's commission pointed out that the occupation's achievements, though impressive, fell far short of expectations partly because Americans failed "to understand the social problems of Haiti." Hoover wanted out, "bag and baggage." Negotiations dragged, however. We refused to withdraw troops unless the new government agreed to American control of the country's finances until 1952, the debt's scheduled payoff date.

On August 15, 1934, about 10,000 Haitians crowded the wharf as the last marines from the longest U.S.

occupation in history boarded ship for home. There was no violence. Crowds cheered and slapped backs. "I was only a boy, but I was there," says hotelier and former diplomat Max Sam. "When the American flag came down I cried." A few days later the country sang and danced itself to exhaustion at the Festival of the Second Independence. Lamented Franck Henriques, "Soon horse dung was back in the street."

When historian Robert Heinl, then a Marine colonel, arrived in 1958 for a special mission to reorganize the armed forces for Papa Doc Duvalier, he found the "telephones gone . . . roads approaching non-existence . . . ports obstructed by silt . . . docks crumbling . . . sanitation and electrification in precarious decline."

In truth, according to historian Hans Schmidt (author of *The United States Occupation of Haiti, 1915-1934*), the long American effort had not changed Haiti much. It had strengthened the national bank, and created a sound national currency. It left some roads and small airfields, and an improved system of communications. To some extent it helped end Haiti's social and economic isolation by inaugurating the growing possibilities of tourism. The Garde d'Haiti provided an important avenue of social mobility for poor and illiterate blacks who were given a chance not only to train for constabulary duties, but to get a secondary education. The Garde had been conceived as a nonpartisan peacekeeping force that would help ensure the right kind of political stability. During the occupation it did so. Afterward, however, the existence of such a force ended by helping political strongmen stay in power—an improvement over yearly revolutions, but not exactly what the United States had intended.

During the past decade, in what seems like a haunting replay of pre-occupation 1915, thousands of Haitians have died in violence. The government has changed seven times in the past six years alone. Blacks and mulattoes are still troubled by their centuries-long antipathy. And now, touched by the plight of Haitian boat people seeking asylum here, many Americans who in the past have roundly criticized other American overseas efforts as "capitalist imperialism," are calling for an international peacekeeping force in Haiti to calm things down and help establish democracy.

Group of Haitian boat people, leaving their country in a time of great economic and political turmoil, head toward Miami. Thousands try and some make it. But many refugees are sent back or drown en route.

Jim directs a small (and rather tight-lipped) security operation. He has six people (we've been told) who patrol an undisclosed number of square miles somewhere in the continental United States.

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Manufacturer's suggested retail price for the 1993 Saturn SL1 is $9,995, including dealer prep. Tax, license, options and transportation charges are extra. Jim Burk is pictured with the Burns International Security Services' 1991 beige Saturn SL1, at 107,821 miles. © 1992 Saturn Corporation.

By David Riley

Our love of dolphins has turned into a questionable affair

Hearts are won over when these marine mammals perform, but many critics believe that it is cruel to keep them in captivity

Robin stands on the backs of two dolphins, one supporting each of her feet. As they zip around the pool at Orlando's Sea World, she holds on to a tether with one hand and waves to the cheering crowd in the grandstands with the other. She dismounts and leads the dolphins through a dazzling array of flips and twirls, fluke waves, and synchronized jumps that form perfect arcs 15 feet above the water. The scene seems flawless—the smiles on the young, tanned trainers, the precise movements of the sleek gray dolphins, the brightly painted building facades standing like Hollywood sets beside a pool filled with azure water.

"As ambassadors of the sea," the emcee intones over a loudspeaker, "these dolphins help us appreciate our aquatic world." And so they do. It's hard not to be impressed by the physical agility and mental prowess of these half-ton wonders of the deep.

Performing dolphins are a big part of a booming business these days. In 1991 ten million people streamed through the turnstiles at Sea World's four marine parks—in Florida, California, Texas and Ohio. About 112 million people visit North American aquariums and zoos every year, more than attend all major league sports events.

Among the marine mammals displayed at oceanariums and marine parks, dolphins seem to hold a special fascination for us. This has been true since antiquity, when Greeks put the dolphin image on coins, wrote about the creatures in legends and decreed that to kill a dolphin was as serious a crime as to kill a person. Part of the special connection is that dolphins are mammals and, like us, are warm-blooded, air-breathing animals that nurse their young.

Dolphins are playful and "full of fine spirits," wrote Herman Melville in *Moby Dick*, adding that if you "can withstand three cheers" at the sight of dolphins gamboling off a ship's bow, then "heaven help ye; the spirit of godly gamesomeness is not in ye."

Our fascination with dolphins was made clear on a

Dolphin performers leap high in the air at Miami Seaquarium, a feat considered natural behavior in the wild. Nosey (left), 24 years old, has lived at the park since 1971, and JJ was born in captivity there in 1976.

recent visit to Connecticut's Mystic Marinelife Aquarium. It was late in the afternoon, and as I watched the dolphins through a large window, the few visitors who lingered appeared mesmerized as the animals turned and glided effortlessly through the dappled light. Sometimes one of them, eyes wide open, headed straight for the glass of the huge aquarium tank, then suddenly veered off at the last second before impact. A young man in a tank top, dark glasses hanging from his neck, started singing to an 8-year-old girl in pigtails, "They called him Flipper, Flipper . . ." He kept repeating the lilting refrain as they walked out.

Aquariums are magical places, but the very thing that makes them so popular—the large marine mammals like dolphins and whales—also makes them controversial. For the past 20 years, with increasing urgency, animal-rights advocates have held demonstrations and initiated lawsuits to ban the practice of keeping the big

Photographs by Douglas Faulkner

marine mammals in captivity. Last June, South Carolina adopted the nation's first state law banning any public display of captive dolphins and whales; in southeastern Australia the State of Victoria has prohibited both their capture and display since 1988.

The controversy is as heated as the stakes are high, especially in Florida, where marine parks attract millions of visitors to a state dependent on tourist dollars. There, in 1989, animal-rights activists tried to disrupt efforts by staff members of the National Aquarium in Baltimore to capture wild dolphins in coastal waters.

The issue heated up again last year when Ocean World in Fort Lauderdale was fined $20,000 and forced to close for two weeks for alleged violations of animal-care standards. Federal government accusations included physical abuse of dolphins and inadequate space, sanitation and veterinary care for them.

When advocates sued the New England Aquarium in Boston over its treatment of dolphins, the facility filed a countersuit for defamation. The aquarium claimed the activists deliberately made false allegations in fundraising letters and public statements. "I consider myself one of the original animal-rights advocates," says director John Prescott, who in 1960 was among the first to find that dolphins use sonar. "But I fall into a different category. For some activists the issue of dolphin rights has almost become a religion."

Richard O'Barry is one of those people. At 52, with light brown eyes, a windblown look and a sharp tongue, he is a kind of Ralph Nader with flippers. He acknowledges his obsession to free captive dolphins and details his experiences in *Behind the Dolphin Smile*, a book recently optioned for a film. O'Barry claims he is not a radical and believes his expectations are realistic. "It was never my goal to close places like Sea World," he says, "but we have to go after the substandard parks and stop using dolphins as performing circus animals."

Flipper *star dies in trainer's arms*

For many years O'Barry made his living capturing wild dolphins and training them to perform at Miami Seaquarium. Five of these were also used in *Flipper*, the TV series popular during the '60s. But in 1970 a searing experience changed O'Barry's life: Kathy, his favorite of the *Flipper* dolphins and a performer for seven years, died in his arms. When the TV series had ended, Kathy was retired to a small steel tank that limited her contact with people and other dolphins. O'Barry believes a lonely Kathy "committed suicide. I don't know what else to call it; it was deliberate. Every breath is a conscious effort for a dolphin, and she just stopped breathing. She died of a broken heart."

O'Barry, with tears streaming down his face, immediately went to Seaquarium's manager and blurted out, "Why are we *doing* this?" He was determined to find a way to make his protest count against the very industry he had helped to create. O'Barry came up with a plan that focused on Charlie Brown, another dolphin he had captured for Seaquarium. Charlie Brown was one of four traded to Lerner Marine Lab in Bimini in exchange for a "box of electronic equipment." Within a week after Kathy's death, O'Barry flew to Bimini—on the eve of the first Earth Day—slipped into the water outside the lab and cut open the sea-pen fence. Charlie Brown was free to leave, but he didn't. He had apparently grown accustomed to people and to his regular feedings. Just as Charlie Brown rejected freedom, so did O'Barry; he turned himself in. Since then he has been arrested many times in his crusade.

Today, from a small office in Miami, O'Barry runs the Dolphin Project, a watchdog program that monitors the treatment of marine mammals. "*Flipper* is both the best and the worst thing that ever happened to dolphins," he says. "The show exposed them to people, and the audience fell in love with them, but at the same time it led to their exploitation. The dolphin's smile is nature's greatest deception—its jawline curves naturally upward. It's an optical illusion, but it brings in the money." O'Barry is now devoting much of his

The dolphin's "smile," though irresistible to humans, reflects the animal's anatomy, not its state of mind.

Flip Nicklin

Young woman tries to remain calm while dolphin jumps over her at Hawaii's Hyatt Regency Waikoloa.

The lagoon is 20 feet deep, more than an acre in size and holds two million gallons of natural salt water.

time to rehabilitating dolphins for freedom. He is currently in Brazil retraining that nation's last captive dolphin, ironically named Flipper, for release. "The dolphin must be taken from its artificial environment into a sea pen so it can experience again the natural rhythms of the ocean," says O'Barry, who describes his plan to "wean the dolphin from people and dead fish." It will be released off the coast of Laguna, Brazil, where it was caught eight years ago.

The bottlenose dolphin, among the most adaptable and therefore most commonly used for performing in marine parks, is not an endangered species. However, for the past three years there has been a voluntary moratorium on its capture in U.S. waters. As the National Marine Fisheries Service (NMFS), the government agency responsible for protecting both wild and captive dolphins, prepares to revise its guidelines for the capture and importation of marine mammals, it is useful to reevaluate the issues. Today there are ten companies holding permits that allow them to capture dolphins, and they adhere to a set quota; any animal accidently killed is counted against that figure.

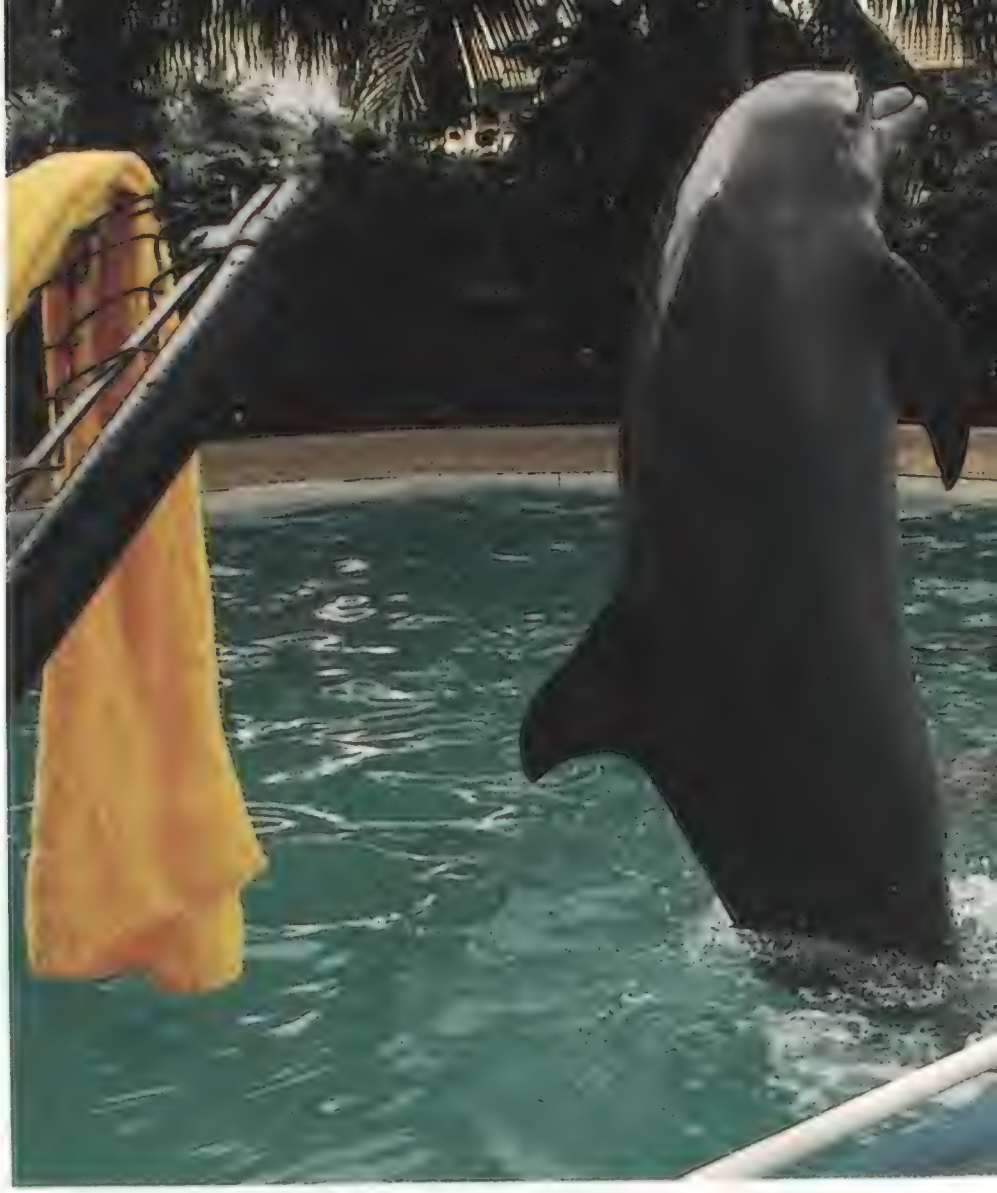
Animal-rights advocates contend that during capture dolphins are easily traumatized and go into shock when removed from the water. But others disagree. Brad Andrews, vice president of zoological operations at Sea World, says "I've never seen it happen." During capture, several boats may surround a small herd with nets that are closed gradually. Panicked dolphins struggle to get away, injuring themselves in the process. Only the healthiest specimens are kept and, according to O'Barry, "most are young females, the cream of the gene pool." A more humane technique involves catching one dolphin at a time with a hoop net that is easily released if a dolphin shows signs of going into shock. A new requirement should help: federal observers must be present on every boat during a capture. But funds and personnel are limited.

Dolphins that survive capture frequently have problems adjusting to a diet of dead fish and may even have to be force-fed. They must also adapt to confinement in a concrete pool or fenced lagoon. The Center for Coastal Studies, a nonprofit marine research group based in Massachusetts, tracked 89 dolphins captured between 1975 and 1977 and found that more than 30 percent died within the first two years. Those who make it past that mark appear to adjust to their new surroundings and live into their 30s and even 40s.

The issues surrounding captivity stir strong emotions, and many mainstream conservation groups are reluctant to take a stand. "Dolphin captivity is not a conservation issue," declares a biologist from a leading marine environmental organization who insists on anonymity. She points out that there are fewer than 500 dolphins in captivity, while more than 25,000 were killed in 1991 by tuna fishermen. To fishermen, the

David Riley is a freelance writer, editor and playwright based in Washington, D.C. who specializes in oceanic and environmental issues.

Activist Richard O'Barry (right) and son Lincoln drive Dolphin Project's theme bus to schools and protests.



Handler uses fish to reward dolphin for following his command during training session at Ocean World.

presence of dolphins usually indicates schools of tuna swimming below. Unfortunately dolphins are caught in the tuna nets and drown when they can't get to the surface for air. Roughly half a million dolphins die annually from man-made causes, including water pollution in coastal areas and the drift nets that are still in use in many countries.

O'Barry rejects the idea that the relatively small number of dolphins in captivity makes their treatment a nonissue. "I'm concerned about the millions of Americans who go to our 'abusement parks' and come away thinking it's OK to dominate animals and manipulate them into performing tricks to please a crowd. How we treat dolphins is a microcosm of our overall relationship to nature."

O'Barry and others object to dolphin captivity because of unique characteristics that make confining them so cruel. Wild bottlenose dolphins range freely, travel as much as 100 miles a day and can easily dive hundreds of feet below the surface. Wild dolphins associate in herds of 50 to 100 individuals, within which they form small groups of male or female peers. Their gestation period lasts 12 months, and the young nurse up to 20 months, so the interval between calving is usually two or three years. Within the group other females sometimes act as midwives or "aunts," helping mothers care for their young.

Dolphins are blessed with built-in sonar that enables them to echolocate—to bounce noises off objects several hundred feet away to determine size, shape, movement and location. Research on captive dolphins indicates how effective their sonar capabilities can be; when given three outwardly identical balls, dolphins can pick out the one with a BB embedded in it. Or, when offered two fish identical in size and shape, they can distinguish the one they like to eat by determining the texture or internal structure of the fish. "To say that dolphins echolocate is like saying Michelangelo painted church ceilings," writes Patrick Moore, a researcher for the U.S. Navy's Marine Mammal Program.

As for dolphin "intelligence," there is much we don't know. The world of the dolphin is very different from ours, and our testing is by human standards; it may be that our ideas of what constitutes intelligence are inappropriate. The dolphin brain is large and complex, similar to the human brain. Researchers have found that dolphins communicate with one another using a variety of squeaks, clicks and whistles. Individuals have distinct signature whistles that others use to call them.

University of Hawaii professor Louis Herman, who has worked with dolphins for more than 20 years, developed two artificial languages, one using gestures and the other, sounds. The dolphins he works with can perform some of the most complex behaviors ever achieved. Examples: dolphins will correctly an-

O'Barry (far right) and Robin Lord of the Fund for Animals protest at Baltimore's National Aquarium.

swer the question, Is there a Frisbee in the pool? And they can understand the difference between a request to carry a person to a surfboard in the pool and a request to take the surfboard to a person. Herman is convinced dolphins are highly cognitive creatures, much like chimpanzees.

Marine parks and oceanariums, recognizing that their dolphins are social and communicative animals, try to group them in compatible combinations, but a group of three or four dolphins confined to a cramped concrete tank obviously doesn't replicate the wild. "I know of no marine mammals kept in captivity in natural conditions," writes San Francisco State University biologist Hal Markowitz. "As a matter of fact, there is an inherent contradiction in using the term 'natural' to refer to captive circumstances."

Federal regulations indicate how cramped those circumstances can be: a minimum tank size of 24 feet in diameter, or twice the body length (whichever is greater), and 6 feet deep per dolphin. Bottlenose dolphins can reach a length of 13 feet; such an animal would stretch halfway across a minimum-sized pool and immerse only half its body if it dove straight down.

Under the best of conditions dolphins die in captivity just as they do in the wild. Two dolphins died prematurely at Ocean World in 1991, out of a total population of 15. The Living Seas pavilion at Disney World's Epcot Center, considered a state-of-the-art facility, has lost four of its six dolphins since 1985. The *Orlando Sentinel*, after conducting a computer analysis of the records on captive dolphins, found that of the 414 bottlenose dolphins captured or born in captivity during the '80s, one-third were dead by January 1, 1990.

"Unquestionably, many animals die," Stephen Leatherwood of the World Conservation Union concludes, but given advances in our knowledge about the health needs of dolphins, "we could end up with better survivorship in captivity than occurs in the wild."

Michael Stoskopf, who spent eight years as the veterinarian at the National Aquarium in Baltimore, stresses the benefits of captivity, "such as high-quality medical care, constant supply of food and freedom from predators." Those who support his point of view believe that such benefits outweigh loss of freedom. Dolphin-rights advocates think the trade-off is immoral. Stoskopf sees both sides: "When people ask, 'What good is a long life without the joys of kelp?' I can't say that they're wrong."

Both sides anthropomorphize the issue. Many activists consider *any* captive conditions for dolphins inhumane, so standards are beside the point. "The underlying issue is whether you believe captivity is appropriate, which is an ethical issue, not a scientific one," says Stephen Leatherwood. "Both sides invoke the pretense of science and engage in public relations ploys to argue their case."

Tom Salyer

Brad Andrews, Sea World's vice president of zoological operations, is in favor of whale (background) and dolphin shows. "Life in the wild isn't as romantic as everybody thinks," he says; "keeping a few breeding members of the species in captivity isn't a bad idea, given that thousands are dying each year in the wild."

Central to arguments about captivity is the question of stress; while many bottlenose dolphins seem to adapt well to almost any situation, a truly miserable dolphin will refuse to eat, get sick, and become noncommunicative or highly aggressive. The Baltimore aquarium's dolphin tank was initially fitted with underwater mirrors to make it appear larger to visitors, but the mirrors "in some way perplexed the dolphins," says Stoskopf. He speculates that "perhaps their visual images didn't coincide with their sonar images. They decided to test the system, so they put their beaks in contact with the mirrors, as if using their sonar, and then surged forward, breaking the mirrors."

The mirrors were removed immediately, but three dolphins developed stomach ulcers and were sent to the Dolphin Research Center in the Florida Keys, where aquariums send sick or injured animals for rehabilitation. After they recovered, the dolphins were returned to Baltimore, but their ulcer symptoms recurred. They were sent again to Florida, then back to Baltimore, but the symptoms appeared once more; this time the aquarium sent the dolphins to Florida permanently.

Sea World, with 85 dolphins in four parks, has had more success in curing this stress-related problem. Vice president Brad Andrews says that "maybe one dolphin in the last year" has been treated for ulcers.

In the mid-1980s, the resort industry built enclosed lagoons where the public could spend as much as $65 a half-hour to swim with dolphins. Thousands of people responded, and some were deeply moved by the unique experience of being so close to such powerful, responsive and gentle animals. The facilities were touted as providing the best care that money could buy, yet dolphins died suddenly without showing any previous symptoms. Four facilities in the United States—three in Florida and one in Hawaii—operate on permits that will run through early 1994. NMFS is now investigating the impact of the programs on the dolphins.

The arguments in favor of swim-with-dolphins programs is that they are educational. At Dolphins Plus in the Florida Keys, supervised autistic children and other differently-abled individuals mingle with dolphins, and experts claim the experience has a profoundly positive effect on the people. The dolphins perform no tricks and aren't rewarded with food, but are accustomed to the presence of people.

Most aquariums make substantial efforts to treat their dolphins well. The reasons are easy to understand: the dolphins attract visitors and are very expensive to maintain. But mistreatment does occur, according to federal investigators, who charged that dolphins at Ocean World in Fort Lauderdale were handled so as to cause trauma, stress and "physical harm" to them. Statements by former employees accused former head trainer Ken Engels of wrestling a dolphin named Shadow and trying to force her into a pen against her will in July 1987. Shadow died a few days later. Engels denies any abuse, characterizing his accusers as self-aggrandizing agitators or disgruntled former employees. Gregory Bossart, Ocean World's veterinarian at the time, also denies dolphins were abused and says Shadow died of pneumonia.

As much as the welfare of individual captive dolphins may pull at our emotions, the larger issue of their educational value is the crux of the controversy. There

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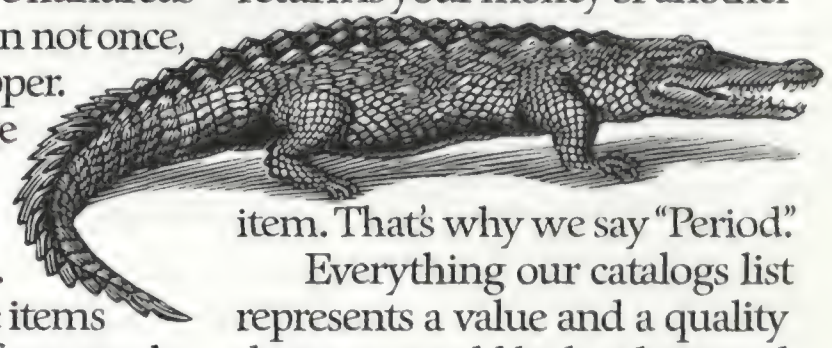

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LANDS' END DIRECT MERCHANTS

is no doubt the public's awareness of dolphins has grown dramatically from watching them perform.

Brad Andrews, who grew up on the beaches of Southern California, has seen major changes in the public's attitude toward protecting the oceans and their wildlife. "I can remember going to Catalina and watching people shoot dolphins off the bow of the boat," he says. In some parts of the world, people still hunt dolphins, but increasing public concern clearly threatens the future of such activities.

Richard O'Barry thinks people are miseducated by the dolphin performances: they are taught that it is all right for humans to dominate dolphins and put them through unnatural routines for commercial purposes. Jacques Cousteau similarly objects: "I am sincerely against using them as circus animals," he wrote, "and therefore I am against the creation of commercial exhibits of live marine mammals." Cousteau has come to oppose keeping dolphins in captivity since a 1958 incident when he watched two captives kill themselves by swimming full speed into the walls of their tank.

O'Barry gives little credit to marine parks and aquariums for improving the lot of wild dolphins: "The attractions industry, which reaches millions of people, has failed miserably. It could have resolved the indiscrimate killing of dolphins by the tuna industry 20 years ago." Asked what political action Sea World has taken to promote conservation, Andrews says: "We provide scientific input to government agencies. We prefer to work within the existing framework." More-visible efforts, he says, "could be misunderstood."

One of Sea World's efforts is opposition to a bill introduced by Representative Porter Goss of Florida that would allow states to provide more-stringent regulations, beyond those of the federal government, in the capture of marine mammals. Sea World opposes the legislation, according to Andrews, because the organization wants to retain the consistency of federal standards, and it believes dolphins are sufficiently protected under them. The bill was soundly defeated. "We basically got lobbied into the ground by the attractions industry," says Goss' legislative director.

But aquariums do make substantial contributions. Federal law requires organizations displaying marine mammals to have education or conservation programs, and some are extensive. The Monterey Bay Aquarium in California devotes 50 staff members, 600 volunteers and $2 million of its annual budget to its education program, reaching 100,000 students every year.

Some aquariums also get their hands dirty with nitty-gritty conservation work. The Marine Mammal Stranding Network serves as a kind of minuteman brigade: aquarium personnel are available on short notice to rescue stranded animals that wash up along our coasts, some dead, others nearly so but capable of rehabilitation if rescued in time.

The attractions industry has also conducted seminal research on dolphins, dating back to the late 1930s, which has led to our enormous knowledge about dolphin physiology, health needs and social patterns, including the ability to learn and communicate.

As animal-rights activists gain more attention, many marine parks and aquariums seem to be making some changes. There is a trend toward captive breeding and displaying local marine ecosystems instead of staging splashy shows. The success rate of keeping and breeding dolphins is also improving—about half of Sea World's 85 were born in captivity, and the grim spectacle of capture teams physically subduing wild dolphins may become a rare if not obsolete event.

Not a drop of water in this marine park

Many newer aquariums are giving up dolphin and whale shows entirely. The Monterey Bay Aquarium highlights the local ecosystem outside its large windows, displaying more than 500 species of fish, mammals, birds and plants—and it has no captive dolphins or whales. Still, the aquarium attracts nearly two million visitors a year. Recently opened aquariums in three other U.S. cities highlight their local ecosystems and do not display dolphins or whales. The Cousteau Society, opposed to dolphin captivity, has taken this trend a step further: its Ocean Park in Paris is a marine museum with no live animals and not a drop of water. It features interactive video displays, a wide-screen film of the underwater world, and a walk through the inside of a life-size model of a 90-foot blue whale.

Do people get as excited coming to a facility without captive marine mammals as to one with them, Charles Vinick, vice president of the Cousteau Society, is asked. "Not yet," he says, "but emerging technologies may

change all that." "Virtual imaging," for example, is being developed by a Japanese company. In a "waterless aquarium," visitors will see what looks like a fish swimming in black space, similar to what they now see in aquariums.

Whatever the future holds, the special relationship that has existed between dolphins and humans since the time of Homer will continue. Even scientists like Stephen Leatherwood, trained to observe life with strict objectivity, recognize the human urge to find "a kindred spirit" in dolphins. Activist Richard O'Barry, practiced at hurling hardheaded accusations at his opponents, softens at the sight of dolphins in the water. Asked what he's learned from them, O'Barry says, smiling, "Happiness in life is the journey itself, not some place you arrive at. Dolphins live that way every day."

Dolphins housed in aquarium enclosures (right) are safe from predators and generally well fed and cared for. But no enclosure can duplicate the open sea for creatures that can swim and soar 100 miles a day.

Doug Perrine

THE FERRAR

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C A M E I N S E C O N D

L I N C O L N T O W N C A R

WHAT A LUXURY CAR SHOULD BE

By Erik Larson

Attention shoppers: don't look now but you are being tailed

In stores all across the country, consumer spies backed by high-tech espionage gear are finding out what makes customers tick

Illustrations by Mark Steele

Paco Underhill was supposed to be a spy, but the morning I met him at a busy shopping mall in Tannersville, Pennsylvania, he didn't exactly look like one. Part of the problem was the Day-Glo-pink baseball cap on his head. It was about as discreet as a sunset at Key West. He was sitting on a bench opposite the entrance to one of the stores, doing what he does best: watching people.

Inside, his agents were hard at work. Underhill took off his cap and entered, nodding at one of the eight surveillance cameras strategically located throughout the store. Nearby, a fellow spy tailed a pair of shoppers as they moved among the many displays. Two others were likewise engaged, looking for a few steamy revelations—not about shoppers, but about the store itself. They wanted to detect how it worked or didn't work, how shoppers moved once they entered, and why far too many customers had been leaving the store in frustration after selecting items they had planned to buy.

Underhill and his New York consumer-research company, Envirosell, are part of a vast national intelligence network devoted to figuring out that most mysterious of Earth's creatures, the American consumer. Our quirks and whims bedevil the soundest marketing plans. One need only recall the Edsel, Ford's legendary failure, or New Coke, Coca-Cola's disastrous attempt at changing the taste of its flagship cola, to appreciate how unpredictable consumers can be—and how much a big marketing mistake can cost in dollars and public embarrassment. Marketers have learned through hard experience that they cannot simply *ask* us what we want and what we think. When buttonholed in a supermarket by an agent from Procter & Gamble, we don't disclose the truth about what we buy, but respond instead with answers meant to conform to some cultural standard of correct behavior. We underreport our bad habits (how much we drink and smoke) and overreport the good (how much broccoli we feed our kids).

If anything, we've become still more unpredictable over the past decade or so. From the 1930s until relatively recently, manufacturers tended to see consumers as one homogeneous mass. We could all be reached through the same media, primarily the Big Three TV networks and a few very-large-circulation magazines, such as *Life, Look* and the *Saturday Evening Post.*

Today, marketers see the country as a patchwork of diverse populations: single-parent households, dual-income households, working women, black consumers, Hispanics, and kids who have enough cash to make their own purchasing decisions.

Perhaps the most serious problem the sellers face is one they themselves created: the barrage of advertising that assaults us every day. Between 1965 and 1990 the number of commercials shown on network TV tripled. We encounter an estimated 3,000 marketing messages daily. In 1990 L. L. Bean alone mailed 114 million catalogs. Every day, by one reckoning, more than 18 million of us get a call from a telemarketer trying to sell us something by phone.

The incentive that drives all this is a rich one. Each year we Americans spend more than four trillion dol-

Ford Motor Company's late '50s flop, the Edsel, was based in part on misconceptions about what the public would buy. To avoid repeating such a fiasco, marketers are enlisting spies to zero in on consumer behavior.

lars on consumer goods and services. This accounts for two-thirds of the country's gross domestic product.

Given the high stakes, marketers and their legions of consumer spies are pursuing us more energetically than ever before. They deploy anthropologists, archaeologists and psychologists to observe us at work and play, film us from hidden cameras, even live with us and keep detailed notes on our daily behavior, all in the hope they will capture some subtle new truths about the way we shop now. And they've developed crafty new technologies to assist in the process.

Nielsen Media Research may soon install special TV meters in the homes of Nielsen families that will recognize each member by his or her facial characteristics; the company expects this new technology to help it better understand exactly who watches each TV show and whether they stick around for the commercials.

Soon, if one inventor has his way, the marketers may even attach special sensors to our bodies capable of monitoring our every contact with a TV, radio or magazine advertisement. "We're not talking future high tech," says Lee Weinblatt, chief executive officer of the PreTesting Company in Tenafly, New Jersey. "This technology is available right this second."

At the dawn of our consumer culture, around 1900, there was little need to go to such extremes. It was easy to come up with a novel product and attract potential buyers. As early as the 1920s, however, companies worried that their messages were getting lost among the ads that so glutted the nation's magazines and newspapers. They worried, too, that eventually consumers would own everything they could possibly want. Detroit in particular feared that soon every household would own a car and not want another.

One solution was to pitch style rather than mere function. Suddenly even toilets came in alluring shades. Automakers began painting their cars shocking colors, including red. In 1927, General Motors began making annual changes in body styles. The stated mission of GM's consumer-research division was the "organized creation of dissatisfaction."

To create dissatisfaction, however, you have to know what makes consumers tick. Why do some people buy one soap and not another?

The challenge for marketers was to find a way to get people to betray their real desires. In the late 1940s Ernest Dichter, a psychologist and Austrian émigré, began applying psychoanalytic principles to consumption. He believed that by studying deep-seated human motivation, he could engineer product images to induce the "tension differential" that arises when people strive for social or career advancement beyond their immediate reach. He urged sellers to use the powers of motivation research "to make people constructively discontented by chasing them out of the false paradise of knowledgeless animal happiness into the real paradise of the life of change and progress."

By 1957 there were 80 research companies that claimed to specialize in motivation research, among them Dichter's Institute for Motivational Research. The motivation researchers saw deep meaning everywhere. Gumchewers were frustrated breast-feeders. And

Wall Street Journal *reporter Erik Larson is author of* The Naked Consumer: How Our Private Lives Become Public Commodities *(Henry Holt & Co.).*

smoking was a "safety valve for autoerotic impulses." Cars, of course, were not merely vehicles that got you from place to place. "A motor car," Dichter said, "is one of the most perfect psychological devices for sublimating our subconscious wish to kill or be killed."

The '60s witnessed a shift from psychology to biotechnology. Marketers hooked consumers to lie detectors to see how commercials affected galvanic skin response. They measured the opening and closing of the human pupil, hoping to see how much attention consumers really paid to advertising. In the early '70s they even began pasting electrodes onto the scalps of consumers to study how brain-wave patterns varied in response to commercial stimuli.

These research tactics shared a fundamental flaw: they forced consumers to pay far more attention to the product or advertisement under study than they would in the real world. To discover firsthand what actually happens in the consumer jungle, the marketers turned to espionage and the likes of Paco Underhill.

As I watched, his agents moved stealthily through the store in Tannersville. They pretended to take inventory of store merchandise. Heads bowed over clipboards, they followed their targets no matter how long the customers stayed or how many times they returned to the same displays. As the cameras whirred and clicked, Envirosell's three "fieldwork specialists," Craig, Tony and Carol, used colored pens to note each shopper's path on individual maps of the store. Each woman was an O, each man an X. The agents guessed their ages. Arrowheads noted the direction of travel. Other symbols indicated where a shopper paused or touched something on display.

During lunch at a nearby diner, Underhill showed me one map choked with pink ganglia, an abstract portrait of shopper indecision. "Two O-3s," he told me, tracing the pink lines with an index finger. "Women, 26 to 40. I would think they are probably trying to buy a present of some kind. The choice is obviously between this pattern"—he pointed at one pink mass—"and this pattern. They've wandered all through the store and they're bouncing back and forth between these three areas. This is *classic*."

The two women finally bought 4 folk-art mugs and 12 clear glasses. "It took them 30 minutes to make up their minds." The tracker had stayed with them all 30 minutes and had not been detected.

Underhill adapted his espionage tactics from the work of William Whyte, a pioneer in the field of urban geography, or the study of what makes a city work (SMITHSONIAN, February 1989). While a student at Columbia University in the 1970s, Underhill attended a lecture by Whyte and was struck by the revelatory power inherent in his use of cameras to analyze the flow of human traffic through public spaces. What Whyte did for city planners, Underhill now does for the likes of Revlon, Hallmark Cards, Bloomingdale's, Quaker Foods and many other large retail corporations.

His research led Underhill to develop a body of observations he calls "aisle theory." Among his seminal

In the early '70s, market researchers began pasting electrodes onto the scalps of consumers to study the way their brain-wave patterns varied in response to advertisements and other commercial stimuli.

findings is something we'll call the derriere-brush factor, although he calls it by another name. At his offices in New York, he showed me a film clip shot with a time-lapse camera aimed at a tie display in a narrow, heavily traveled aisle of the Bloomingdale's department store in Manhattan. Such aisles, meant to carry shoppers from store entrances onward into the store, are known in the retail industry as "driveways" or "power aisles."

Shoppers entered and dispersed; most zipped right by the ties.

Underhill stopped the projector.

"Stand up," he commanded.

I stood.

"OK, you are standing at a counter. You are looking at ties. One of the most sensitive parts of your anatomy is your tail."

He began brushing my tail with his hand. Derriere-brush factor, he told me, "is simply the idea that the more likely you are to be brushed from the rear while you shop, the less likely you'll be converted from browser to buyer." In retail-speak, the "conversion ratio" of that display or counter will be low.

Underhill's stop-action film showed how few people stopped to examine the ties in the rack. Traffic swept past the few browsers in disconcerting volume.

When Bloomingdale's chairman saw the video, he called the clerk in charge of that department and had him move the tie rack out of the driveway. Later, a Bloomingdale's vice president called Underhill and told him the chairman had personally had the sales tracked from that lone tie rack and discovered that within six weeks the increase had paid for Underhill's services. "That told me two things," Underhill said. "One, I wasn't charging enough, and two, the markup on ties was even more obscene than I thought."

"He picks up commonsense things," said Judith Owens, vice president, marketing, of the National Retail Federation in New York, who periodically invites Underhill to show his stop-action films to the federation's many members. She watched one film of an audio store that drew a mostly teenage clientele, yet placed its racks of CDs so high the kids couldn't reach them. "You watch that happen, then you hear Paco say if you drop your display by 18 inches you'll increase your productivity. Everybody says, my God, I never thought of that."

He showed AT&T that almost 20 percent of the people who came into its Phone Center stores were under 10 years old, and how salespeople spent a lot of their time simply protecting expensive phone systems displayed too close to the ground. His films showed how most people who entered a Revco drugstore failed to pick up a shopping basket and thus were automatically limited to buying only what they could carry.

Early in 1991, the Woolworth Corporation asked Underhill to study several of its Champs Sports stores to help figure out which layouts and designs worked best. Woolworth was planning a huge national expansion of the chain. It knew that sales from the rear section of each store—the "hard goods" section displaying such items as weights and basketballs—lagged far behind sales from other sections, but it didn't know why.

Using colored pens, espionage agents record different customers' routes on individual maps of each store.

"The obvious isn't always that apparent"

John Shanley, director of research for Woolworth, remembers how Underhill's stop-action film instantly solved the mystery. During peak sales periods, a line of customers would form from the cash register to the opposite wall of the store. "It literally prevented people from going from the front to the back," Shanley recalls. "They walked up to this line, turned and walked away." As a result, all of Champs' 500 stores now feature a checkout area (known in the industry as the "cash-wrap") designed so that lines form along an axis from front to back. "All of a sudden the sales in the back of the store picked up," Shanley recalled.

But, I asked, shouldn't that barrier effect have been obvious without Underhill's help? "The obvious," Shanley answered, "isn't always that apparent."

AMERICAN
PLAYHOUSE

Viewers' Profiles:

Kevin Kline

"Playhouse reminds me consistently of how much TV can do. Their programming happily ignores the status quo of the medium and brings out first-rate work from the artists it challenges."

Bernadette Peters

"It's a chance to see film and theater from artists you may not yet know—or to see people you do know doing the kind of work they can't do anywhere else. It keeps TV at the cutting edge."

Marilyn Horne

"The American Playhouse series on PBS is the one way I have to relax completely at home while staying on the edge of my seat. I put my phone on mute, my life on hold, and my mind on 'play.'"

For viewers in tune with television's potential, Chubb is proud to help bring the vision of American Playhouse onto the air and into your home. As we celebrate our ten-year partnership, we salute the artists and audiences who have made this the longest-running anthology series in history.

SOME OF THIS SEASON'S HIGHLIGHTS

Strangers in Good Company
A funny and fascinating chronicle of seven elderly women and their discoveries in an abandoned house.

Straight Out of Brooklyn
This look at a black family's battle against the odds launched the career of 19-year-old filmmaker Matty Rich.

Good Morning, Babylon
Two immigrant brothers discover America on the set of a D.W. Griffith epic. Greta Scacchi and Vincent Spano star.

Fires in the Mirror
Racial conflicts in a Brooklyn neighborhood simmer and explode in Anna Deavere Smith's tour de force portrayal of over 30 characters.

Thank You & Goodnight!
Humor, heartache, drama and documentary merge in this offbeat look at the life and death of the filmmaker's grandmother.

La Carpa
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The more likely you are to be brushed from behind at a counter, the less likely you are to make a purchase.

In certain situations, marketers argue, consumer espionage becomes almost a necessity. Figuring out kids, for instance. Children stymie researchers who approach them with adult tactics. Once, for example, Langbourne Rust, one of America's foremost observers of youngsters, asked a group of second-graders what they thought of a certain brand of toothpaste. They said they liked it. They liked the way it looked. It tasted good. There was just one problem: the product they were so enthusiastic about didn't even exist.

Rust has devoted more than 20 years to watching kids, sometimes from behind one-way glass, for such clients as ABC, CBS, NBC, the Children's Television Workshop (producers of *Sesame Street*) and McDonald's. Recently he spent a lot of time standing discreetly in store aisles to help marketers figure out how best to take advantage of the way parents and their offspring interact. He noticed that girls tend to get more involved in choosing specific brands than boys and thus "may perhaps be a more productive target for advertising." He also found that parents control the intensity of their kids' product demands through deft navigation of store aisles. And dads, Rust learned, are suckers. Or, as a progress report rather more delicately put it: "Fathers are often less skilled at negotiation than their usually more seasoned female counterparts."

Today's marketers look for hidden truths even in our most mundane acts. Allison Cohen, president of a consulting firm called PeopleTalk, routinely invites herself into homes to videotape people's cupboards. A client once asked her to find out what "home cooking" means today. "The best way to find out was to go watch it," Cohen told me. "Going in and watching women making dinner was really eye-opening because the idea of what constitutes home cooking has changed so drastically in the last generation. Women are now more engineers than they are artists. Dinner might come from frozen packages of fried chicken, tater tots and onion rings, and a ready-made apple pie. You heat it all up and that's a 'home-cooked' meal."

Sometimes she shows her films to the consumers who star in them. "They say things like, 'My God, we had lunch three times that day! And we all ate different things.' For them that's a revelation, because even though it's a fact of life, they don't sit down and think about it. They sort of think of themselves as eating three meals a day together."

Occasionally, snooping can get researchers into trouble. In 1989 a couple in Orange County, California, rented a room in their house to a Japanese man who had been referred to them from an agency that finds temporary housing for Japanese visitors. The couple was shocked when they later saw their guest identified in the *Los Angeles Times* as a market researcher for a major Japanese carmaker, and read about how he had "photographed their house from dozens of angles, then drove alone around the neighborhood, shooting every home on the block," and of how he had poured his observations into "a notebook each night in his guest room." (The couple sued the company, charging invasion of privacy, but later dropped the action.)

Coming: the sneakiest monitors of all

Soon, we may not have to worry about outside spies tracking our every consuming move. We'll spy on ourselves. Inventor Lee Weinblatt showed me how.

He was leaning over a long table in a conference room at his PreTesting Company headquarters. He held a "handwand scanner" designed to pick up faint electronic signals emitted by tiny chips known as transponders. One of them lay on Weinblatt's table. Roughly the size of a grain of cooked rice, it comprised half the technology Weinblatt figured he would need to build the ultimate consumer-monitoring tool—a system that would provide a second-by-second record of our every contact with the commercial world.

Weinblatt, the Thomas Edison of marketing research, prides himself on capturing the real-world behavior of consumers. In the early 1980s, he began hiding cameras in ceilings, boxes, shelves and lamps to study such phenomena as how people really watch TV. Once, to learn how commuters read newspapers and magazines, he installed a tiny camera in the shoulder pad of an employee's suit and had him ride the Long Island Railroad.

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His eyes have seen what yours could not. Until now...

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His work has all but demolished the notion that grocery shelf displays always boost sales. In one supermarket study, Weinblatt's cameras documented shoppers' reactions to a promotion offering them a free plastic bag. "It took two and a half days before someone just *looked* at it," he says.

Weinblatt's real-world tests show that many shoppers fail to notice changes in product packaging. "We found that strictly relying on the box itself in nine out of ten cases is an absolute waste," Weinblatt said. "That's what goes wrong in a focus group. Everyone sits around a table, you come out and say, 'Here's a new Diet Coke,' and ask, 'What do you think?' But who says, when shoppers are rushing down an aisle, that they'll even *look* at the Diet Coke?"

Now Weinblatt proposes to build a miniature version of the handwand scanner—to make it so small, in fact, that he'll be able to hide it in a wristwatch. The watch, available in a variety of styles, will be worn by a select sample of consumers. It will capture special electronic signals broadcast every time a wearer opens a magazine or comes close enough to a radio or a television to hear a commercial.

Each broadcast commercial will be branded with its own unique code number, an electronic equivalent of the bar code printed on most packaging. This number will be transmitted through unused carrier frequencies just as captions are now transmitted to special adaptors placed on the TVs of hearing-impaired viewers.

Each magazine will have its own code number too, the number stored in a tiny transponder implanted in its binding or perhaps in an ad insert similar to the perfume ads we all encounter. Magazines will transmit their signals each time they are opened, engulfing us not with fragrance but inaudible electronic signals. The watch might even identify the wearer to a special checkout scanner, which in turn will collect all the code numbers scanned from the wearer's purchases to see just what impact all those media encounters have had on his or her behavior.

The fundamental technology did work, I knew. Chips like the one on Weinblatt's table had been injected into baby salmon to track their travels through Northwestern rivers. Stray dogs in London have been implanted: if lost by their adoptive owners, they can be readily identified by authorities with a quick pass of the scanner.

If Weinblatt succeeds in deploying his watch to the wrists of a random sample of American consumers, he could shed light on many enduring mysteries of consumer marketing. At last companies could learn just how many TV, radio and print advertisements we really do encounter during the day. If used in conjunction with checkout scanners in our supermarkets, Weinblatt's telltale watch could even allow advertisers

to quantify, for the first time, how subtle changes in the mix of radio, TV and print advertising alter the contents of our shopping carts.

Clearly there are a great many obstacles to Weinblatt's plan. How do you make the scanner small enough to fit in a watch? How do you persuade magazines to implant transponders in the bindings of all their magazines? Who's going to build the things?

Weinblatt insists he is in no hurry. He holds patents on all aspects of the idea. "Right now I have no pressure," he told me. "Patents are good for 17 years. Technology is moving toward me, not away."

Will consumers agree to wear the watches?

Probably. Although marketers report growing resistance to their surveys, consumers remain amazingly cooperative, as if the task of assisting America's consumer industries were a patriotic duty. "Boy, I'll tell you," Weinblatt said, "we are a hell of a country. We will let people know anything. I work on everything from products for vaginitis to perspiration. People here will answer the most detailed questions from an absolute stranger, where in other countries you'd have your head handed to you if you just asked what brand of mouthwash someone used."

A few months after my visit to the store in Tannersville, I called Underhill to ask what his surveillance had uncovered. The store needed more chairs, he told me. Chairs would allow men to sit down while their more enthusiastic wives continued scouring the store. He mused that the store ought to consider even more direct ways of separating husband and wife—perhaps by placing a TV among the chairs, tuned to a football or baseball game—thereby leaving the wives free to shop and, of course, to spend.

Also, the store needed to do something to reduce the long lines that formed each weekend day. Underhill's trackers tailed shoppers who became so frustrated with the long wait at the checkout counter that they simply put down the items they planned to buy, and left. This was important news. "We forget," said the executive who hired Envirosell, "that the last impression shoppers get is the cash register, and we've always treated that as a stepchild. On a busy day, on a Saturday, the lines really become an obstacle."

Envirosell captured a more subtle problem: the store had not set out an obvious place where shoppers could return their shopping carts once they were done with them. They simply left them where they stood, adding to the congestion.

Paco Underhill captures nuance. He tunes the performance of stores to bring out that extra percentage point of profit. His Tannersville client told me he considers Underhill's $24,000 fee to be money well spent. "If we get one or two good ideas out of it and pick up some extra business, what I paid him will be peanuts."

It's time for a change to Gallo.

Shellfish bouillabaisse with cilantro.

©E. & J. Gallo Winery, Modesto, CA.

Ernest & Julio Gallo

Chardonnay

Philip-Lorca diCorcia

By Phil Patton

How is a museum curator's job like a good juggling act?

Organizing photography exhibitions, reviewing portfolios, visiting studios and—in between—returning calls, Peter Galassi has his hands full

Peter Galassi was a little nervous. The new curator of photography at New York's Museum of Modern Art stood to address the press at the opening of his 1992 show "More Than One Photography"—a selection of some 1,000 photographic works the museum had acquired since 1980. The show was his first "statement" as curator, and its very title contained an implicit credo. As the first art museum to take photography seriously as art by establishing a regular program of exhibiting and collecting photographs, MOMA had projected a vision for years of "one photography," a historical progression of images largely separate from the other arts.

Now, Galassi was talking about cultivating diversity and breaking down boundaries. He outlined ambitious plans for the future: a reinstallation of the permanent collection, more variety, more change, more thematic and group shows and fewer "blockbusters," the mono-

Walker Evans, *Church Organ, Alabama,* 1936 (Mr. and Mrs. John Spencer Fund)

Brassaï (French), *Kiki Singing in a Montparnasse Cabaret,* 1933 (David H. McAlpin Fund)

Weegee (born in Austria), *Harry Maxwell Shot in Car,* c. 1941

Doug DuBois (American, born in 1960), *My Sister Lise, Christmas Eve,* 1984 (Purchase)

Galassi's second home: MOMA's photography storage area.

lithic shows that he believes "ill-serve our audience."

But he acknowledged a certain crisis photography faces, best summed up on a wall label at the entrance to the show. With other arts, advertising and design latching on to photography, "the question of whether photography is an art has been supplanted by the question, equally difficult to answer in the abstract, of when photography is just photography."

Photography for the photographer is all about selection—of framing and focus and printing. Photography for the curator is also about selection—of the photographer and of the photographs. The pictures Galassi chose for the show suggest his outlook. They ranged from Joel Sternfeld's head-on color image of a yuppie lawyer in Greenwich Village to Russian photographer Tofik Shakhverdiev's *Moscow, 1989*—an image of Stalin tattooed on a man's chest. They included mixed-media works by such artists as the German painter Anselm Kiefer and the French sculptor Christian Boltanski.

Galassi is one of the most powerful figures in the world of art photography. He is busy these days mounting shows, supervising a collection, chasing after new photographers and old photographs. Along with the collection, Galassi has inherited a tradition—and a crisis that demands a new view of photography. "Life isn't perfect," he began the catalog to the 1989 show "Pleasures and Terrors of Domestic Comfort," "but then photography isn't either." At the end of the catalog essay, Galassi reversed the sentence: photography isn't perfect, but then life isn't either. He has mounted a genial, reasonable countercampaign on behalf of the imperfect medium.

Galassi's words seemed to seek a détente with photography's critics. While most of the photographs MOMA has shown in the past were "straight"—unretouched and unmanipulated—he is remarkably undoctrinaire

August Sander (German, 1876-1964), *Bricklayer's Mate,* 1929 (Gift of the photographer)

about issues of technical reproduction. The camera can be digital, the number of prints unlimited, the print altered and manipulated; Galassi cares for the immediate image above all.

A pile of diet soda cans ready for recycling lies just inside the entrance to Galassi's office, which is a statement in nondecoration. On one wall is a panoramic image of a Texas fig farm, first hung by his predecessor, John Szarkowski. On the other, two drawings by Galassi's 7-year-old daughter.

There is a large room, part library, part meeting room, whose tables provide seeming acres of space for laying out pictures. In back rooms the entire collection, sleeping in black boxes, is kept cool and dry by its own climate-control system—ten degrees cooler than ambient air. Especially delicate objects—many color prints, for instance—are kept in a refrigerator at 35 degrees F. There is a lot of work to be done conserving the collection. Many older images, such as those from the '50s mounted on Masonite, need to be rematted or fitted with Mylar cover sheets. A few years ago, when photographers and curators learned that color prints were less stable over time than had previously been thought, the museum instituted a policy of acquiring two prints of each image chosen for its collection—one to show and one to keep out of light.

To follow Galassi through his rounds is to slice into an astonishingly varied geology. Right now he is advising curator Edward Robinson on a show entitled "The Young Rebel," including photographs by Robert Frank, Danny Lyon, William Gedney and others, whose work echoed popular images of James Dean and Marlon Brando. ("Not to lean over his shoulder—" Galassi says, "just to make sure he doesn't fall off the cliff.") There is a lot of freedom for curators within the department. Curator Susan Kismaric, who has been at the museum since 1976, is putting together a show of photographs of politicians, slated for 1994. She has previously mounted major shows of contemporary work by photographers from the United Kingdom and from California.

On one wall stands an assemblage of yellow squares and rectangles that could pass for an abstract construction. It represents the plan for the hanging of a show of work by Lucas Samaras (p. 89), known for his manipulated Polaroid images. Galassi is also reinstalling the permanent collection, with much advice from staff. It is rare to see a whole historical survey of photography presented permanently in a museum.

Up a few steps from the museum's second-floor hall is the cozy warren of rooms where the permanent collection is hung. The works are arranged in almost exact chronological order, from the first, relic-like daguerreotypes through views of Civil War battlefields by Mathew Brady and Alexander Gardner, through more expansive landscapes of the American West by Timothy O'Sullivan and of Egypt by Francis Frith. The great names are represented: Stieglitz, Steichen, Strand, Dorothea Lange, Edward Weston, Walker Evans. . . Unlike painting, Galassi notes, there are no masterpieces that must be displayed, that visitors would be disappointed not to see—they count on finding Strand, but not necessarily a specific picture.

Paul Strand (American, 1890-1976), *Church on the Hill,* 1946 (Gift of the photographer)

So high is the level of work in the collection that adding to it could intimidate anyone without a firm belief in his own eye. And Galassi is conscious of how difficult it is to at once present and discover photography in its current diversity.

"You can't take this job for five years," Galassi says. "It takes eight years to make an impact." Yet there is so much new photography—so many new photographies—he believes, that it is hard to stay abreast of it all. You can do the job, he says, or you can keep up with what is going on. But for the long term, you cannot do both.

Each Thursday the department meets to review the portfolios submitted by eager photographers hoping to join the collection. Galassi is not looking for the next Paul Strand or Walker Evans or Diane Arbus. "It would be self-defeating to look for instant classics in the weekly review," he says. "It would inhibit my alertness to original experiment."

"Some weeks, nothing," says Edward Robinson, a Beaumont and Nancy Newhall Curatorial Fellow. "But last week we had a number of wonderful ones."

Galassi's department numbers only eight, and meetings are quiet and collegial. But Galassi is nostalgic for the days when things were even more informal. When he first arrived in the mid-'70s, he recalls, "photographers would drop by without appointments to show portfolios or just chat."

The review process seems highly relaxed. Each portfolio is passed from hand to hand, with silent and thorough study punctuated by comments that suggest the curators' long familiarity with one another. A strict rule exiles coffee cups to beyond the viewing perimeter. By afternoon, the portfolios will be picked up by their owners or shipped back to them.

"Here's an example of the photographer who is good but not the next Walker Evans," Galassi says of one portfolio. One set of photographs of female nudes seems more appropriate for the kind of magazine convenience stores put high up on the shelves.

Another portfolio belongs to Frank Sellitto, whose work impressed Galassi during a visit to the Rhode Island School of Design, where Sellitto was a student. Some of the large color prints are of Nashville music fans. But the one that catches Galassi's eye is of a group of Mexican workers in a bar, all browns and reds. He pulls it aside from the group and studies it. "I want it," he says.

Another group is by John Milisenda, who has spent years photographing his family in Brooklyn. Leafing through the black-and-whites, Galassi lets his eye linger on an image of the father and brother in a car and on another of the two in a living room, swirled in smoke, "almost dreamlike," as he says.

The fact that "More Than One Photography" included lithographs, paintings, sculptures and books that feature photography bore testimony to one of Galassi's interests: opening up the department of photography to the museum's five other departments—painting and sculpture; drawings; prints and books; architecture and design; and film—which in the past have often seemed compartmentalized. All have collected works that are photographic in one way or another.

The modern idea of photography as art

No one did more than John Szarkowski, known as the "czar" of art photography, to establish the medium firmly within the domain of art. In this he was building on the department's foundations. It was the idea of photography as art—itself a modern idea—that was the museum's major contribution, more than any particular brand of photography called modern. That is why, while most of MOMA's departments collect works going back to the 1880s, photography goes all the way back to its beginnings in the 1830s.

MOMA's photography department was officially established in 1940, but its role as the country's leading advocate of photography as art had begun earlier, thanks to Beaumont Newhall. Hired as the museum's librarian in 1935, Newhall also took over some of the

chores of photographing items in the collection, setting up a darkroom in the men's room. Then, at the request of Alfred Barr, the venerated founding director of MOMA, Newhall mounted his first photography exhibition, a survey of the medium from its beginnings to 1937. There soon followed an important show of the work of Walker Evans (who had also been hired by the museum to shoot documentary images of African masks and other objects for its files).

Newhall's successor was the photographer Edward Steichen, whose career spanned years and roles—from gum-bichromate to Kodachrome, advertising to military reconnaissance. He is best remembered for the enormously popular 1955 "Family of Man" exhibition, a virtual inspirational essay rendered in photographs. When he was hired as director in 1962, John Szarkowski was best known as the author and photographer of a book on the architecture of Louis Sullivan.

Szarkowski's view of photography

The caricature of Szarkowski's view was that photography ran in a single line, as in painting: a steady forward march from Eugène Atget to Walker Evans to Robert Frank, then to the "new documentarians" Lee Friedlander, Diane Arbus and Garry Winogrand, and on to color photographer William Eggleston. This assessment is not entirely fair; Szarkowski also offered vernacular images: "From the Picture Press," in 1973, examined the role of tabloids in shaping modern vision. And despite his reputation for focusing on Americans, Szarkowski presented a survey of Japanese photography and shows on Brassaï, Brandt and other Europeans.

In the '50s, in painting especially, Galassi says, "if you got on the right train you were pretty much all right. But there wasn't much room for other viewpoints." In the introduction to the "Pleasures and Terrors" catalog he refers to the "one true path."

Just when photography was accepted as art, it came under attack by critics who saw it as a meretricious servant of advertising and propaganda, an unreliable presenter of "reality"—all the more dangerous because it was so convincing. A new generation of photographers blurred the borders between photography as art and art that used photography. Some used it to imply narratives, tell stories—an implicit acknowledgment of its status as fiction. Cindy Sherman donned costumes and took pictures of herself in mock versions of film stills. Barbara Kruger used photographs to "illustrate" elliptical social and political slogans, in a hybrid between art and advertising. Such experiments broke down boundaries between photography and other arts—a process begun by Warhol and Rauschenberg. By the time they were finished, something odd had happened: photography had emerged as a carrier of ideas as well as images—in a time when ideas and images often blended.

Because of his reputation for being less than enthusiastic about this so-called Postmodernist use of photography, by the end of his tenure Szarkowski had become the object of criticism in parts of the photography world. Galassi's arrival has been greeted warmly by contrast. "He's really opened up the department," one photographer says, sotto voce, and many echo him. Szarkowski, who has been traveling and making his own photographs since retirement, comes around the museum often and is still a powerful voice in the field.

The job practically guarantees its occupant a good deal of criticism. Galassi has taken his own share of flak from critics. When *New York Times* critic Charles Hagen, with whom he once shared a house in Rochester, had negative things to say about some of the selections in "More Than One Photography," Galassi claimed to be unruffled. Speaking of major shows organized by John Szarkowski, he says, " 'New Documents,' 'Eggleston'—they all got panned.

"You can't let it bother you," he adds. But, warming to the topic as we walk through the galleries later, he says, "For anyone to think that this wall"—bearing a group of images of faces—"is only about portraiture is just, just . . . just blind!"

In 1965, when Galassi was 14 years old, his parents loaded the family into a silver-blue Chevrolet station wagon and set out on a cross-country vacation. From their home in Plympton, Massachusetts, they drove west, across the Mississippi to the Grand Canyon and the West Coast, then up to Washington State and back. His grandmother had lent him her camera—an Argus C-3, known to photographers as "the Brick"—and all along the way, Galassi took pictures, framing the family in front of one landscape after another.

A good student, Galassi was tracked toward medical school at Harvard, but after a year he realized his interests lay elsewhere. He managed to switch into the Department of Visual and Environmental Studies, where he studied with Rudolph Arnheim and the photographer Barbara Norfleet—taking time to play the cornet with the marching band and to work on *The Advocate*, the literary magazine. For *The Advocate*'s special issue on James Agee, he talked to Walker Evans and wangled prints of several of his photographs.

In Cambridge, too, he began going to shows and to talks at Imageworks, a local photography gallery. He never forgot the response Lee Friedlander, who began his career photographing jazz musicians, gave to a persistent questioner who kept inquiring what the pho-

Phil Patton's book Made in U.S.A.: The Secret Histories of the Things that Made America *will be published this summer in paperback.*

Text continues on page 90

Curator's choice at MOMA

The Museum of Modern Art has acquired more than 300 photographs since Peter Galassi was appointed director of the Department of Photography in October 1991. A selection of them is reproduced here and on the following pages, along with a few acquisitions Galassi proposed earlier. Each year, contemporary works make up most of the photographs that are acquired. But the museum actively seeks older ones as well, because the history of photography is still very much in the process of being discovered.

Whether historical or contemporary, photographs range from straightforward, descriptive works, such as those of Julia Margaret Cameron or Nicholas Nixon, to invented imagery, such as the multiple exposure by El Lissitzky or the collage by Lucas Samaras. Some photographs—for example, the composite map of the surface of the moon from Surveyor III—were not intended as works of art, but are now collected by art museums because they have changed the way we see.

Above: El Lissitzky (Russian), Untitled, 1924 (Gift of Shirley C. Burden and David H. McAlpin, by exchange)

Mike and Doug Starn (American), *Double Rembrandt with Steps,* 1988 (Gift of Barbara and Eugene Schwartz)

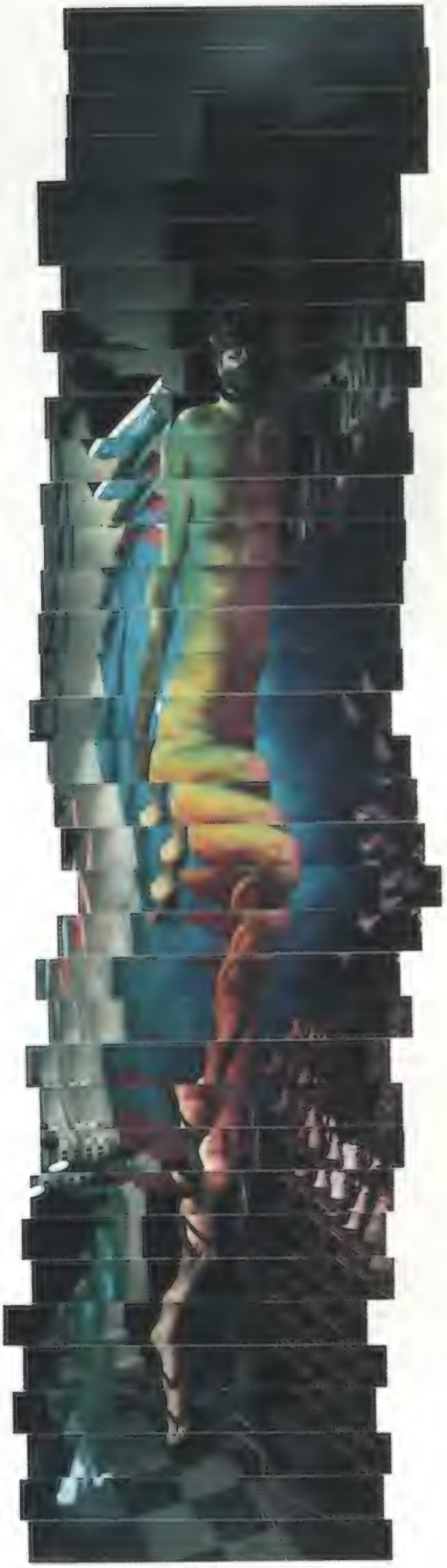
Julia Margaret Cameron (British), *Horace Darwin*, c. 1868 (Gift of Shirley C. Burden, by exchange)

Robert Rauschenberg and Susan Weil, Untitled, c. 1950 (Gift of Carolyn Brown and Earle Brown)

Nicholas Nixon (American), *C.C., Boston*, 1983 (Gift of Nicholas Nixon in memory of Garry Winogrand)

John Gutmann (American, born in Poland), *Jitterbug, New Orleans*, 1937 (Barbara Ferry Hooker Fund)

U.S. Geological Survey and NASA, Surveyor III, *Surface of the Moon, Day 319*, 1967 (John Parkinson III Fund)



Lucas Samaras (American, born in Greece), *Panorama*, 1983 (Gift of Robert and Gayle Greenhill)

Dennis Farber (American, born in 1946), *Youthful Appearance*, 1988 (The Family of Man Fund)

tographer was thinking when he took a certain photograph. "That," Friedlander declared, "is like asking Oscar Robertson"—the basketball great—"what he was thinking when someone threw him the ball."

After graduation in 1972 he joined a group of college friends at a new "alternative" newspaper in Richmond, Virginia. It never quite caught on, and in 1974 when he heard about a job at MOMA as a curatorial intern he jumped at the chance.

Before he was named associate curator at MOMA in 1981 Galassi had already begun work on a doctorate at Columbia University in art history, on "real art." Never doctrinaire about the virtues of photography as compared with other media—his dissertation was published last year as *Corot in Italy*—he mounted a show for MOMA, "Before Photography," that crossed disciplinary lines. Its central point was that painters had begun to look at the world through photographers' eyes before the invention of photography.

In 1987, his exhibit on the early work of Henri Cartier-Bresson, the champion of the hand-held Leica and the "decisive moment," provided a new take on one of the medium's—and one of MOMA's—established masters. Before he spoke at the opening in 1989 of "Pleasures and Terrors of Domestic Comfort," he was much more nervous. As a show it was a major statement, and it was also a way of relating himself to MOMA tradition. Work by MOMA stalwarts normally associated with the documentary tradition—William Eggleston or Lee Friedlander, for example—was included. There were also newer names, such photographers as Philip-Lorca diCorcia, a Galassi favorite. "Pleasures and Terrors" represented a pulling back toward private, introspective photography. In his catalog, Galassi compared the new domesticity to the fiction of the '80s, of Raymond Carver and Mary Robison. It was an interest foreshadowed by his 1988 show on Nicholas Nixon (p. 88), who did much work on his own family and his wife's family. It was an echo, perhaps, of Galassi's own original discovery of photography in the setting of a family vacation.

"Pleasures and Terrors" began as an idea several years before for a show of women photographers including Mary Frey, whose recent work matches scenes of women in domestic settings with disjunctive captions, Sage Sohier and others. "Shows often evolve that way," says Galassi. He and his colleagues dream up at least twice as many ideas for shows as they ever realize. "We could have done a show focusing on three or four photographers, but we decided that the sum of the phenomenon was greater than its parts."

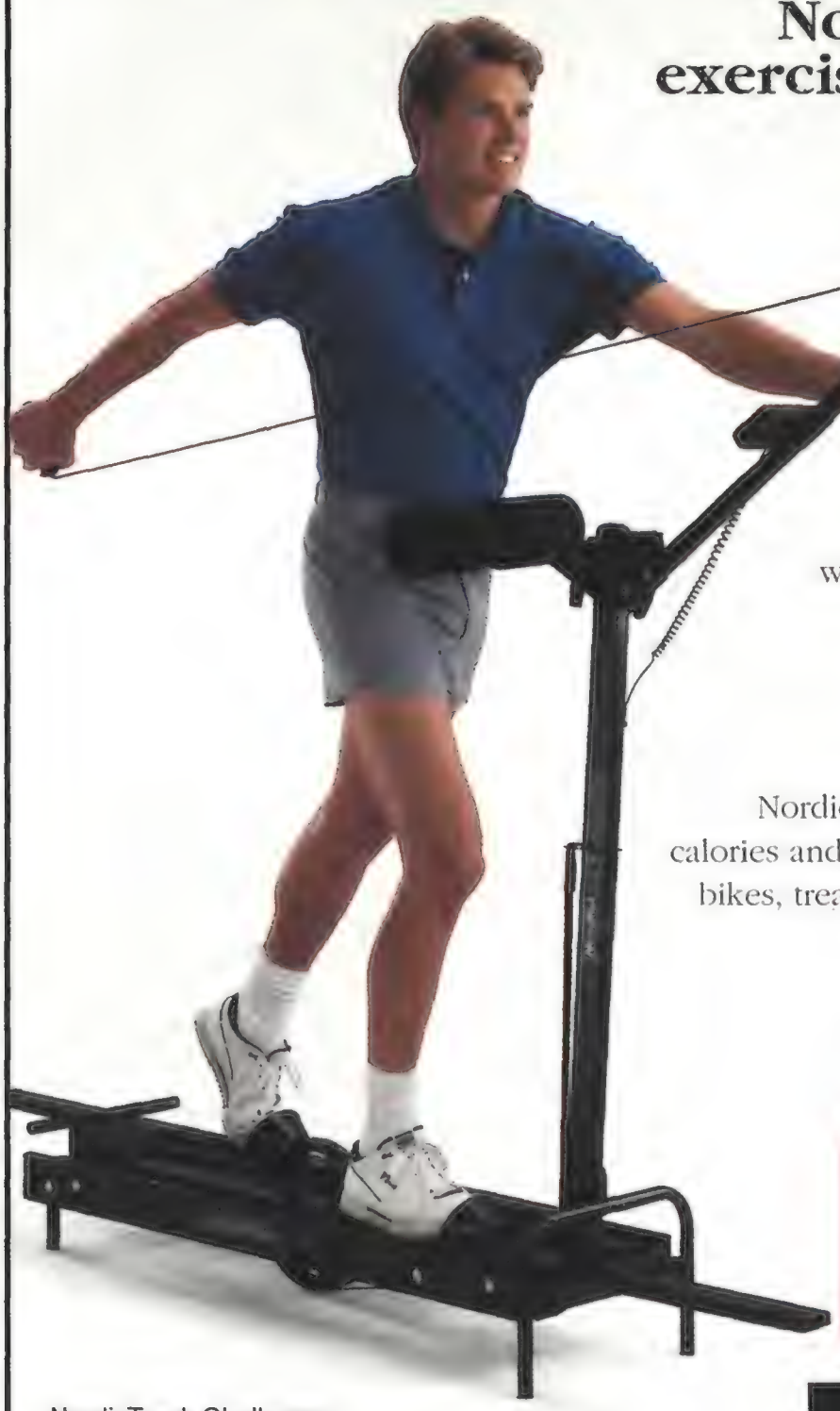
Nine months intervened between Szarkowski's announcement of his retirement and the official designation of Galassi as his successor, in October of 1991. The interval led to speculation in the "Intelligencer," *New York Magazine*'s gossip column, among other places, of a struggle over the succession. No, says Galassi, it was simply the museum's considered pace.

Surveying a landscape of fresh images

The most recent of Galassi's exhibitions is "New Photography 8" (on view at MOMA through the 12th of this month), the eighth in an annual series dating back to 1985. Usually, three or four photographers are included; this time there are eight, ranging from Toshio Shibata, a Japanese photographer of terraced and cultivated landscapes, to Gundula Schulze, from the former East Germany. Darrel Ellis took photographs of images made by his father, also a photographer, projected onto plaster forms. Mary Miss, better known as a sculptor, is represented by photographs joined at their edges to reflect three-dimensional spaces above. The German Dieter Appelt, by contrast, assembled 30 images of water flowing over a boulder in a stream, taken at 30-second intervals, under the title "*Das Feld*"—"The Field."

Another of the photographers who is represented in "New Photography 8" is Dennis Farber, whose work was also included in "Pleasures and Terrors." He arrived one afternoon with a new series of work: photographs of photographs printed in vintage children's books of the '30s. These images Farber had variously

Why settle for a cheap imitation when the real thing is now so affordable?



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Mary Miss (American, born in 1944), *Untitled—Egypt*, 1990 (Purchased with funds given by Agnes Gund)

manipulated with sandpaper, graphite and oil sticks. Kids at the seashore or in the bath end up wearing heads like birds or Ku Klux Klansmen; their bodies have been turned luminous as jellyfish or aliens.

Galassi pondered the pictures spread out on the tables. Each of the lush color prints, produced by a special 20-by-24-inch Polaroid camera—the same type used by William Wegman (SMITHSONIAN, September 1991) and leading advertising photographers—wears a fringe of color where the chemicals spread at its edges. Galassi has a sure, if unconscious, knack of commenting not too much, of either conveying gentle approval or silent rejection. "That one I definitely want." He pointed to an image of a little girl. "And her too."

Galassi's job is selection, but his occupation is the search. For eight years, for instance, he has been following the work of Robert Flynt, whose photographs are included in "New Photography 8." One hot day last summer he stopped by Flynt's TriBeCa loft. Flynt had arranged a series of bulletin-board-like panels in the bare-beamed loft and hung them with photographs to mock up his own vision of how his pictures could be presented as a "total environmental experience."

Flynt's pictures overlaid images from books—of Greek sculpture or wrestling holds; of first-aid diagrams, weather patterns or astronomical maps—with underwater photographs, mostly of male nudes. There are shadowy implications of the AIDS plague in the juxtaposition of nude male figures with weather maps showing a hurricane's path; or wrestling holds labeled "predicament," "near fall," "fall"; or diagrams from a manual showing first-aid carries for disabled people.

Galassi is not opposed to Flynt's plan, which juxtaposes large prints and smaller ones, but "the key thing is to get the strongest work," he says. He remembers Flynt's work well; it has been shown at a number of galleries and published in *Aperture*.

"The guts of the work are where the images overlap rather than comment on each other, like a time lapse," Galassi says. But he remembers images he does not see here. After leafing through a stack of books of 8-by-10 prints in which Flynt records his work, Galassi asks about several of the images he recalls. Two are hanging at the back of the loft. By the end of the afternoon, Galassi surveys a half-dozen of the large prints that he is convinced are the strongest.

Photography remains a comparatively small budget item in the big-budget art world of today—a fact of which Galassi seems somehow proud. "More Than One Photography" cost about 1 percent of "Matisse," the $4.5 million blockbuster show just about to close at MOMA. Attendance per square foot in the photography galleries, he says with ill-concealed pride, is comparable to that in the museum's painting and sculpture galleries.

A number of endowed funds and regular corporate boosters support the department, along with devoted collectors and "friends." Income from the *Family of Man* book, based on Steichen's enormously successful 1955 show—now generally thought of as middle brow, if not sentimental, in the photography world—supports acquisitions of photographs that tend, ironically, to be very different in spirit.

Four times a year the museum's committee on photography meets to consider gifts and purchases Galassi and the department recommend. Galassi goes to the meeting with a list of items divided into "must have" and "would like to have." This time around, the total has run over budget. Two of the committee members, as is common, have volunteered to make up the difference. Only one of Galassi's choices has failed to get approval.

The excitement of unearthing new treasures

A few days after the photography committee meeting, Galassi brings out two big black boxes with the mingled pride and excitement of a naturalist fresh from a particularly successful collecting expedition. Each of the new photographs will itself be photographed, catalogued and inserted in the proper file.

"Here you see the collection coming at you in all its incongruousness," he says, opening the boxes on the big tables. There are big pictures and little ones, old and new, black-and-white and color. His excitement in part comes from the fact that the group contains surprises—and perhaps gambles. That is a luxury of

the medium. "We can't pretend we never make a mistake," he says, "but the risk is smaller compared to, say, painting and sculpture, where each masterpiece is a major investment."

There are gifts, which must also be approved: a huge work by Mike and Doug Starn, several mid-19th-century prints of North Africa by J. B. Greene, and a tiny print of contemporary Alabama by William Christenberry. A 1960 image of JFK by George Zimbel. Several pictures by Maurice Tabard, a follower of Man Ray. Several by Herbert List, an early modernist. "The fruit of a long process," Galassi says with satisfaction. "One step down from the masters of the heroic period, between the wars, but the second level was still high. The tide of invention lifted all boats.

"With Impressionist painting, for instance, you can count that there are not going to be many surprises. But in photography, new things come out all the time," Galassi says. "Our highest priority is still recent work, but to stop adding to earlier periods would arrest the collection at a certain stage of understanding."

Galassi keeps bringing out the treasures. Two prints from Adam Bartos' color series of the United Nations building, showing its '50s modernism as cold and faded when viewed close up in a seemingly casual way. A montage of photographs of the surface of the moon taken by the Surveyor spacecraft. And, finally, out come two images from the portfolio review: Frank Sellitto's Mexicans in the bar, and John Milisenda's dreamlike view of his father and brother—the one Galassi had admired.

But the prize of the group is a Julia Margaret Cameron portrait of Charles Darwin's son Horace (p. 88). Dating from the late 1860s, it is a pensive close-up, unromanticized and full of candor without being a candid. Galassi, when he first saw it, was smitten with its bluntness, its psychological intensity. It is the kind of discovery that excites him, a reminder that the history of photography is still unfolding all the time. Although it is 130 years old, it is a modern photograph.

Zeke Berman (American), *Table Study*, 1983 (Gift of the photographer). The Museum of Modern Art rotates the works in its galleries frequently, displaying only about 1 percent of the collection at any one time.

You've seen this demonstration before, but never for a $13,000* car.

The front wheels are on a dynamometer. Ten seven-inch glasses have been placed on its hood. The engine starts. The wheels turn. Quickly, the car reaches speeds in excess of 100 mph. The glasses remain in place, perfectly intact.** But all perceptions that a car has to be expensive to be exceptional have been completely shattered.

The new *Nissan Altima*™ has just arrived, and already automotive history has been made. A car that starts at $13,000* has just passed the luxury sedan entrance exam for smoothness of ride.

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*Nissan Motor Corporation in U.S.A. Smart people always read the fine print. And they always wear their seat belts. *Manufacturer's suggested retail price for Nissan Altima XE excluding taxes, title, license, destination charges and options. Manufacturer's suggested retail price for test vehicle (XE model with automatic transmission) is $13,824.*

Simulation of actual test.

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***Based on independent tests conducted by AMCI. 1993 Nissan Altima XE or SE versus 1992 competitive vehicles. Merging power based on time and distance required to accelerate from 20-55 mph. Slalom comparison based on course completion time. Braking based on stopping distance from 50-0 mph on a wet road surface.*

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QUICK MULTI BALL
3 MIL
MAX
HIT IT

By Carl Hoffman

Here's a game that will make you flip every time you play

Remember pinball? Well, it's back, wilder and wackier than ever, with nutty story lines, music, sound effects and talking characters

At New York's Broadway Arcade, pinball wizards Dwayne Alexander and Joel Grant (left) work flippers.

Get out your quarters, pinball fanatics. It's showtime. Here in this warren of cramped rooms on Chicago's bustling North Side, the 1,500 employees of Williams Bally/Midway are building tomorrow's machines today. That skinny, fair-haired character over there is Brian Eddy, a software engineer. He's hunched over a computer connected by a tangle of wires to a new model called "Bride of Pin•Bot." And look! As he works his keyboard, the Bride awakens. Her heart begins to beat and her eyes blink open. "Hi there," she says, and breaks into song.

There's digital-sound engineer Dan Forden. He's helping compose "Bride's" original musical score, as well as an intricate cacophony of special sound effects—what he calls a pinball machine's "sonic landscape."

Nearby, Joe Joos, head of the mechanical engineering department, is fiddling with "ramps," "thumper bumpers," "slingshot kickers" and "flippers"—the working parts that make a pinball machine go.

That mustachioed fellow standing next to the window with paintbrushes is artist John Youssi. He's illustrating the Bride's life story for the machine's cabinet.

Last, but certainly not least, here's the celebrated Romanian-American game designer Python Anghelo. At 39, with his tousled dark hair and flamboyant manner, he resembles a Hollywood auteur. And, like a director who orchestrates an army of actors, crews and technicians to turn his vision into a film, Anghelo is overseeing and inspiring Eddy and the others to produce what he calls "one of the greatest things Americans as tinkerers have come up with since the telephone and the light bulb."

Colored balls leave trails as they ricochet around "The Addams Family," a best-seller after 1992 debut.

Pinball machines have evolved from the relatively primitive games that used to be found mainly in saloons into computerized wonders that feature two or three playing levels, a complicated story line and an array of gizmos that can send balls rocketing faster than the eye can see. Building them is an American art form dominated by Williams Bally/Midway and two other companies in Chicago, Data East and Premier Technologies. Developing a new game, of which perhaps 10,000 to 15,000 units will be sold at around $3,500 apiece, can take up to 18 months and cost as much as $1.5 million.

You still find pinball machines in taverns, but now, as you have no doubt noticed, they're also blinking and buzzing in airports, family amusement centers, street arcades, shopping malls, convenience stores and just about anywhere else people congregate. After languishing for the better part of a decade in the long shadow of video games, pinball has bounced back with a vengeance. Nearly ten billion quarters were dropped into more than one million pinball machines in this country last year. The worldwide figure is probably triple that. No one keeps statistics on who's dropping those quarters, but it's common knowledge that although

Photographs by Wayne Sorce

Designer Python Anghelo explains a new concept to (from left) Roger Sharpe, Brian Eddy and Joe Joos in office at Williams Bally/Midway. Anghelo dons mask (far right) when he's in the mood for clowning around.

many women are interested in the game, most pinball players are men.

What's behind all this? Charles McGovern, a curator at the Smithsonian's National Museum of American History, thinks pinball reflects a conspicuous theme in this country's culture—the clash between the individual and mechanization. "Machines have made many good things possible," he says, "but they've also usurped more and more of our lives. Pinball is a way to play out that conflict."

For the typical player, pinball is just a sometime thing, but there's a growing subculture of devotees and collectors who think of little else. People like Rick Stetta, a 32-year-old full-time player from Sunnyvale, California, who is given to making pronouncements like, "Pinball is physical, and life is physical, and pinball and life go together." Or Joel Grant, a 35-year-old mail-room supervisor from Brooklyn who plays pinball five nights a week in Manhattan's Broadway Arcade. Or even Robert Berk, who runs a family restaurant-supply business in Warren, Ohio, and recently spent $30,000 to construct a building just to hold his collection of more than 500 pinball machines. There are pinball leagues and tournaments. There are even publications that cater specifically to collectors and other enthusiasts.

Pinball is descended from bagatelle, a game French soldiers brought to America during the Revolutionary War. The essentials of bagatelle were a cue, some small balls and a slanted table that had holes at one end. The idea was to shoot the balls into the holes with the stick. In 1871 Montague Redgrave, a young Englishman living in Cincinnati, patented the world's first crude pinball game. He replaced the bagatelle cue with a spring-operated plunger, covered the playfield with obstacles made of brass pins and added enclosed "courts" containing bells that rang whenever a ball hit them. He made small tabletop models for home use and ornate, five-foot-long versions for saloons.

Dozens of game makers copied Redgrave's idea, but it took the Depression and a Chicago manufacturer of coin-operated amusements to turn bagatelle into a

Carl Hoffman was 13 when he first played pinball, at the Funland arcade, Rehoboth Beach, Delaware. He wrote about tractors in the August 1991 issue.

commercial success. David Gottlieb introduced a colorful 16-by-24-inch version called "Baffle Ball" in 1931. Available in both home and coin-op models, it cost less than $20. Within six months, Gottlieb had sold 50,000 of his coin-op machines. Most of them ended up in drugstores and barbershops.

"Baffle Ball" was a perfect antidote to the Depression. "For a penny," says Richard Bueschel, a prominent collector and the author of *Pinball 1—Illustrated Historical Guide to Pinball Machines,* "you could walk into a drugstore and get three or four minutes of entertainment. People loved it."

Gimmicks to enliven the game

A 1932 coin-op trade show featured 67 pinball games, and within a few years 150 different companies were making them. The early ones were compact countertop affairs with no electricity or sound. That, of course, wasn't good enough. Designers began introducing new gimmicks. The first electrified game had a kick-out hole that shot the ball back onto the playfield and rang a bell. The first "tilt" mechanism was a small ball perched atop a pedestal. When an overly zealous player tilted or jarred the table, the ball fell onto a metal ring that completed an electrical circuit and shut down the game. By 1935 games had sound and lights. They were bigger, sat on legs and featured boxes that displayed a player's score. Thumper bumpers—the stubby round posts that send balls zooming across the playfield when you hit them—were introduced in 1936.

To get a leg up on the competition, some manufacturers had begun making machines that rewarded players who achieved high scores with a free "bonus" game. Still other manufacturers began making games that paid money or tickets redeemable for cash. These versions became known as "bingo" or "payout" pinball. Unlike the old game, which was played strictly for fun, bingo pinball was seen by opponents of gambling as little more than a slot machine in disguise.

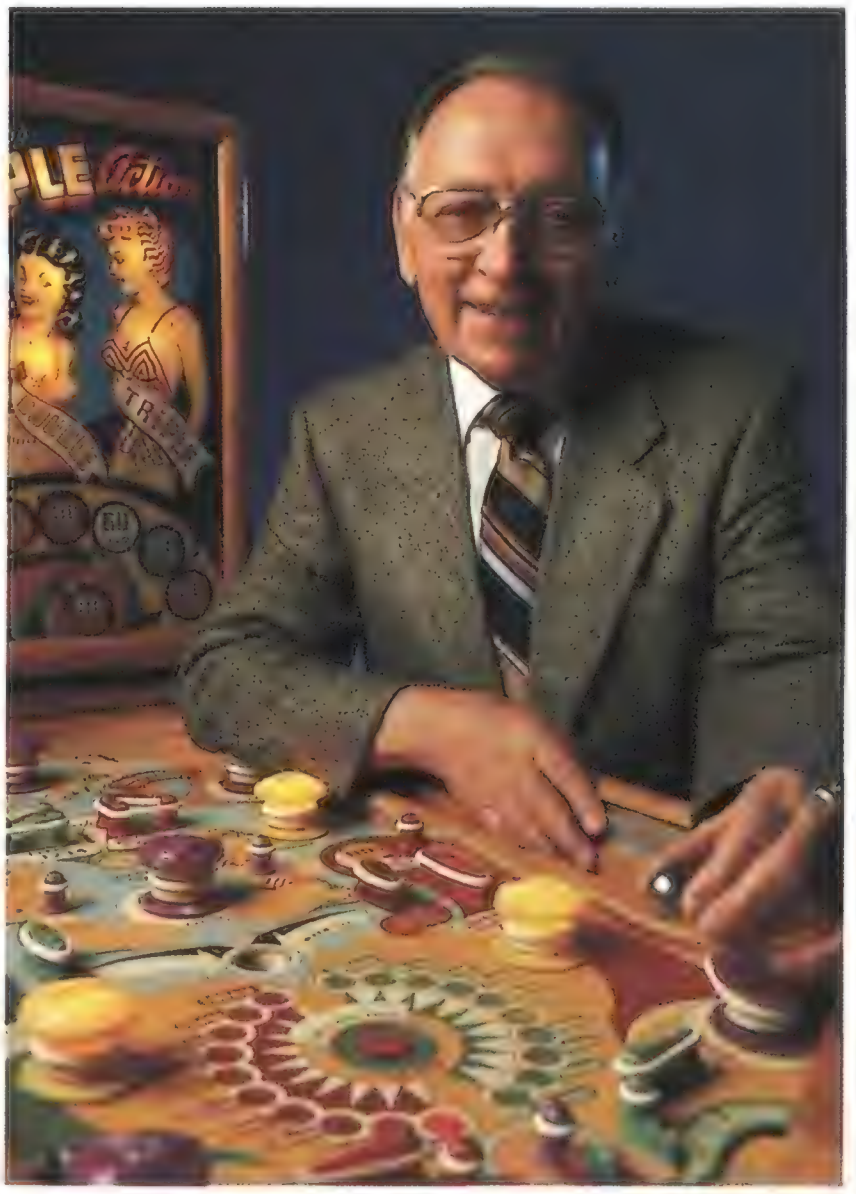
In 1941, New York's feisty mayor, Fiorello La Guardia, initiated a ban on all pinball games in his city. The distributors and manufacturers were "slimy crews of tinhorns, well-dressed and living in luxury on penny thievery," La Guardia declared. One of his favorite publicity stunts was to smash machines with a sledgehammer for eager news photographers.

Thus began a 35-year dispute known as the "pinball wars." There were two wars. One was the campaign waged by government agents—local, state and federal—against the supposedly corrupting influence of bingo pinball. The other was the campaign for legitimacy waged by manufacturers of amusement pinball machines against the manufacturers of bingo pinball machines—and against government officials who refused to differentiate between a machine that paid out and one that didn't. Notwithstanding this distinction, both games were banned in Los Angeles and Chicago, as well as New York.

It wasn't until the 1970s that amusement pinball was legalized again in these cities. By then, an innovation that revolutionized the game had long since become a standard feature—the button-operated flipper.

When first introduced in 1947, flippers were scattered willy-nilly all over the playfield. It was Steven Kordek (below), now director of pinball design at Williams Bally/Midway, who thought of locating a single pair of them at the bottom, where the balls fall into the return slot. That enables you to keep a ball in play longer and run up the score, making skill an important part of the game.

In 1976 Roger Sharpe was an editor at *Gentlemen's Quarterly* magazine and an avid pinball player. When the New York City Council decided to hold hearings on rescinding La Guardia's ban, Sharpe was called to testify. The central issue hinged on whether pinball was purely a game of chance, in which case the council



Steven Kordek leans on his 1948 creation "Triple Action," first machine with pair of flippers at bottom.

Game of "Baffle Ball" became an antidote to the Depression.

Redgrave's saloon version of parlor bagatelle dates from 1876.

was likely to let the gambling-related prohibition stand, or a game of skill, in which case the council would probably legalize it. Two machines had been set up in the council chambers. Sharpe remembers going up to one of them and demonstrating how it worked. "There were five lanes on top, and I explained that if I pulled the plunger back just right I should be able to get the ball in the lane I wanted. The next ball went right in, and the council said, 'OK, that's it.'" The members voted 6 to 0 to legalize pinball in New York City.

Today, a pinball mecca stands in the heart of La Guardia's city at the corner of Broadway and 52d Street. The Broadway Arcade has a suitably seedy look, with its bright lights and worn fake-brick floor. It attracts a loyal following of enthusiastic regulars, most of whom travel an hour or more from New York's outer boroughs or from New Jersey to play its modern, well-maintained machines. "I see 75 percent of the people in here on a daily basis," says owner Steve Epstein, whose father bought the place in 1962. "You'll find rock stars, messengers, Pulitzer Prize-winning writers, lawyers, doctors and clerks playing side by side. Pinball is a great equalizer."

It's also a great noisemaker. Today's games don't just whistle and ping—they hector you, harass you and tell you what to do. "You don't want to go down there!" yells Rudy the talking dummy in "FunHouse." Pinball is still a matter of launching a ball onto a playfield and hitting as many targets as possible. But games like "FunHouse," with solid-state electronics, computers and even original musical scores, are lightning fast and enlivened by crazy touches like Rudy.

On a typical midweek evening at the Broadway you may see Joel Grant engrossed in "Terminator 2: Judgment Day." At another machine, still in shirt and tie from his job as a computer file clerk in the personnel department of ABC, stands 22-year-old Dwayne Alexander. These guys don't just mindlessly bang away with the flippers. They artfully nudge the machine, manipulating the ball with body English. They "cup" the ball, balancing it on a flipper after catching it at exactly the right moment. They're adept at the old "Lazarus ball" trick, saving a ball with a precise nudge after it has already slipped between the flippers and nearly gone out of play. "I come here every night after work," says Grant. "It's the way I release my tension. You can scream at a machine, push it around, and it's always going to be there waiting for you to beat it."

Although there are dozens of video games in the arcade, pinball players tend to disdain them as kid stuff. (The majority of video-game players here are under 25.) "Video tends to present the same pattern over and over again," says Grant. "In pinball, every ball is different." Indeed, says Epstein, pinball is live and video is not. "You're looking at kinetic energy at work. You're looking at something that is very real, very chancy and yet very much under your control."

If national tournaments are an indication of a game's stature in this country, then pinball's comeback is verging on big time. Three major pinball tournaments are held each year—in Chicago, Milwaukee and New York—and although none can yet be termed "big league," all seem to be headed in the right direction.

Not that long ago, more than 200 players from 20

Pinball historian Richard Bueschel displays part of his collection of bagatelle games from 1870s to 1960s. He's holding up "Cuckoo," the first home game to incorporate a moving part, the spinner, on its playfield.

states, Canada, Scotland, Spain and Great Britain gathered in the Galaxy Ballroom of the Hilton Hotel at Chicago's O'Hare Airport to battle it out for the International Flipper Pinball Association's World Championships and a total of $10,000 in prize money. Picture the scene. Bright lights. A haze of cigarette smoke. Forty machines lined up along the walls, each with a contestant tensely stationed in front of it, hands braced above the flipper buttons. This is a beer-swilling, sneakers-and-jeans crowd made up almost entirely of men under 40 who haven't spent much time working on their tans. The players are paired off by lot, and the winner must take three out of five games of three balls each before moving on to the next round.

If the players were seeded, Rick Stetta would hold the number one spot. *Sports Illustrated* calls him "the best pinball player in the world." He lives in an enormous mobile home with his wife, Barbara, and their 22 pinball machines. "I had nothing but floor space until I met Rick," Barbara says. Rick has won most of the major pinball championships in the past couple of years. He is thin and high-strung, with shoulder-length hair and a narrow mustache. His hands sweat so much when he plays that he's often fingering a small towel. He started playing seriously when he was 15 and began collecting machines when he was 24.

For two days in the ballroom, the machines honk and yell from early morning to late at night. Small groups of competitors spontaneously gather to watch whatever match appears interesting. In action, Stetta appears unstoppable, easily dispatching his opponents while accumulating unbelievable scores. He plays while listening to a Walkman (he says it helps him concentrate) and gyrates wildly, as if there were an electrical current running from the Walkman through his body and fingers and straight into the machine. He's been doing best at "FunHouse." "You're making me very unhappy," Rudy the dummy complains.

By the time the championship match of the men's singles competition rolls around it's midnight, and everyone has gone home except the two finalists—Stetta and Dave Hegge, a telephone repairman from Chicago—and a few other diehards. Hegge isn't looking too enthusiastic. "I'm tired," he says. Not surprisingly, Stetta wins in one of the tournament's shorter matches. "I won! I won! I won!" he shouts, jumping up and down. His reward: a plaque and a check for $425, which does not even begin to cover what he spent to come to Chicago.

For some fans, just playing pinball isn't enough. Take Dennis Dodel. He has 90 machines set up in the basement of his home in St. Louis, Missouri, and another 50 sitting in a warehouse. Dodel's family owns a printing company. In 1986 he started publishing *Pin-*

Fiorello La Guardia tips over a pinball machine at a police warehouse for confiscated games. As Mayor of New York, La Guardia crusaded against pinball games because he considered them to be little more than slot machines in disguise. He reviled the pinball manufacturers as "slimy . . . tinhorns."

ball Trader with a list of 100 collectors. When he sold it about a year ago, circulation was close to 1,300, and what had started out as a four-page newsletter had become a full-fledged publication that sometimes ran to more than 40 pages.

Collecting began as a hobby but is increasingly "more of a money thing," Dodel says. As growing numbers of collectors chase a finite pool of classic machines, prices go up. The value of many machines has doubled since 1986; some that cost only a few hundred dollars new are now worth as much as $1,500.

Credit for at least part of the collecting boom has to go to Robert Berk, the restaurant-supply dealer from Ohio who owns more than 500 games. It was Berk who organized the first Pinball Expo in Chicago, in 1985. Now an annual event, it consists of an exhibition of old and new machines, the Flip Out Tournament and seminars about everything from designing games to restoring them. Last November more than 1,000 people attended the Expo, some traveling from as far away as Australia and Japan.

In the late 1970s it would have been hard to envision the possibility of such a phenomenon. That's when video games arrived on the scene. Videos threatened to consign pinball to the dustbin of history: they were more sophisticated, more action-packed and more thematically complex. They were also far easier to master. By 1983 pinball accounted for just a fraction of the $5 billion being generated annually in this country by coin-operated games.

Pinball manufacturers responded by incorporating some of the design elements of video games—especially computer-synthesized lights and sound—and re-emphasizing mechanics. "Americans are intrigued with little devices," says Pat Lawlor, a designer at Williams Bally/Midway, and creator of "FunHouse" and "The Addams Family." "For a long time pinball kind of forgot that." Lawlor, 41, grew up in Chicago and vividly remembers playing coin-operated games at a famous but now defunct amusement park called Riverview. He started college as a physics and math major, graduated with a degree in theater and communication arts, and ended up programming computers for the video-game division of Bally, which became part of Williams Bally/Midway in 1988. Eventually he moved on to pinball.

The flashy new approaches cooked up by Lawlor and other designers infused the once moribund industry with new vitality. By 1991 pinball revenues had grown to nearly a third of the coin-op market. Because pinball machines have become so complex and expensive to build, a company is able to bring out only a limited number of new games each year. "It's valid with movies, it's valid with pinball," Anghelo says. "It takes a lot of talented people to put together a great pinball machine." His employer has eight design teams.

The backbone of the new-generation machine is the story line. It's usually the head of the design team that comes up with a theme. "FunHouse" was based on Lawlor's memories of Riverview. Anghelo himself had the idea of creating the robotlike protagonist of "Bride of Pin•Bot." "What we're selling is escape," he says.

Once the concept is nailed down, the lead designer draws a full-scale layout of the playfield. Then, abetted by technicians, he assembles an unadorned prototype

called a "white wood." This model is used to try out the game's kinetics—how the ball moves between the flippers and the bumpers, ramps and targets. It's not unusual for a team to go through a number of white woods before a game reaches its final stage. Then artists go to work illustrating the playfield, back glass and cabinet. They also determine what special features such as Rudy the dummy will look like. Mechanical engineers design the game's moving parts. Electrical engineers work out the electronics. Sound engineers compose the carnival of music and noise that must be different for every target. Computer-software experts figure out how to make it all work.

Once most of a new machine's kinks are ironed out, Williams Bally/Midway will scatter a few prototypes throughout the factory. Employees play them, recording their impressions and scores on a sheet of paper taped to the back glass. After further testing, 100 to 200 sample machines are tried out at various test spots across the country and abroad. If the game performs reliably in the field and makes money, it goes into production. An average run might produce 7,500 machines in four months, which are sold to distributors. A popular machine stays in circulation for years, typically journeying from, say, a gleaming new arcade to a bowling alley to a convenience store to a truck stop, and finally, to a tavern in some small rural town. "It's funny," muses Roger Sharpe, who is now the company's director of marketing, "our biggest competitors aren't the other pinball manufacturers. They're our own old games."

Sexy robot on the back glass of a game introduced in 1991 epitomizes synthesis of technology and glitter that has enabled pinball to win over a new generation of devotees. In this game, the "Bride" talks and sings.

Applause. . .

"...a quieter, redesigned 1993 Geo Prizm Sedan...styled and engineered to reduce wind, engine and road noise."
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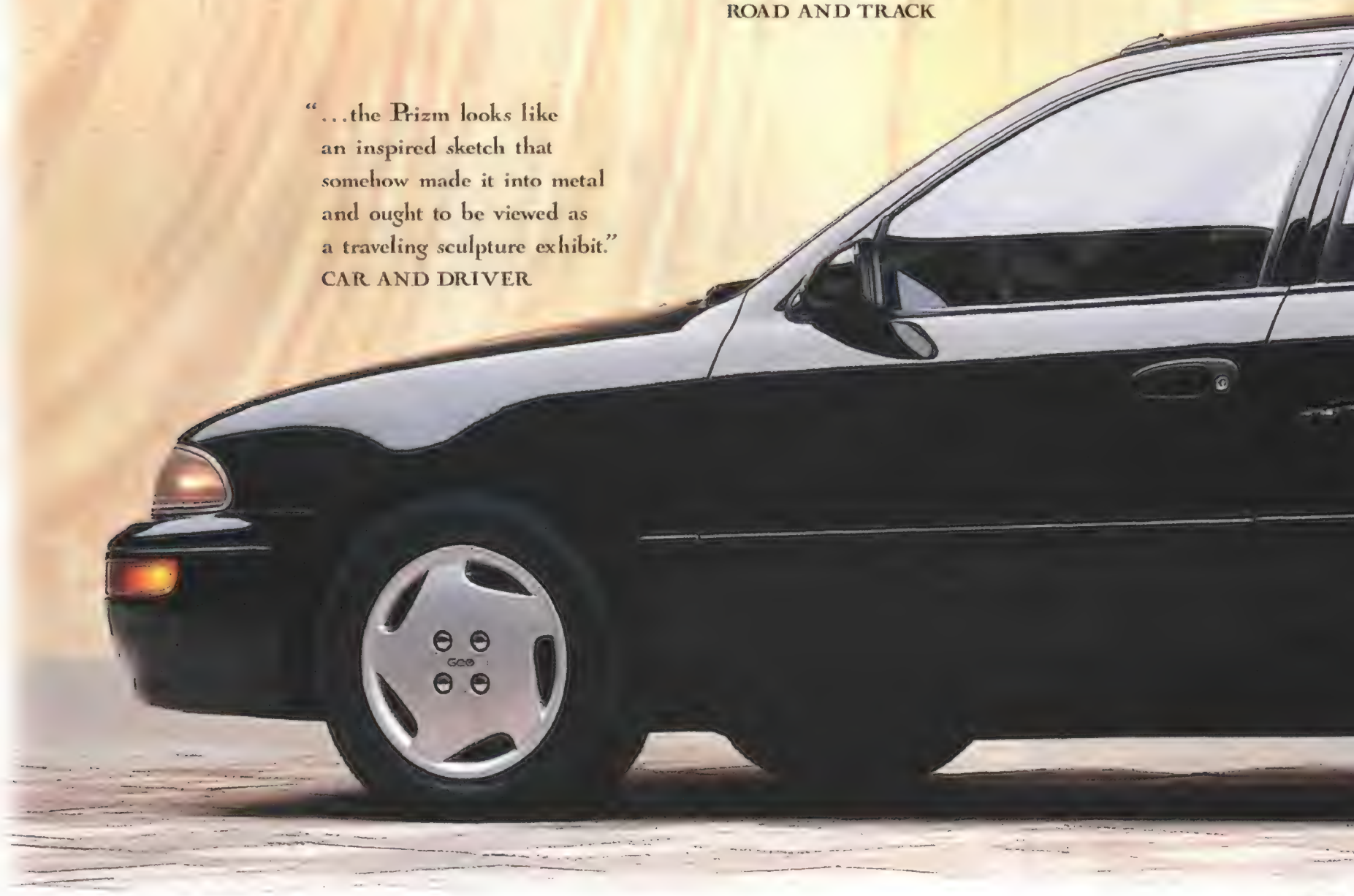
CAR AND DRIVER



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Excuse us while we take a bow. In the meantime, why don't you get to know the new Geo Prizm? A car so well-thought-out and so well-designed, it's bringing the critics to their feet. In article after article, automotive journalists cheered Prizm's aerodynamic new look, pointed out its available anti-lock brakes and praised the standard driver's-side air bag.*

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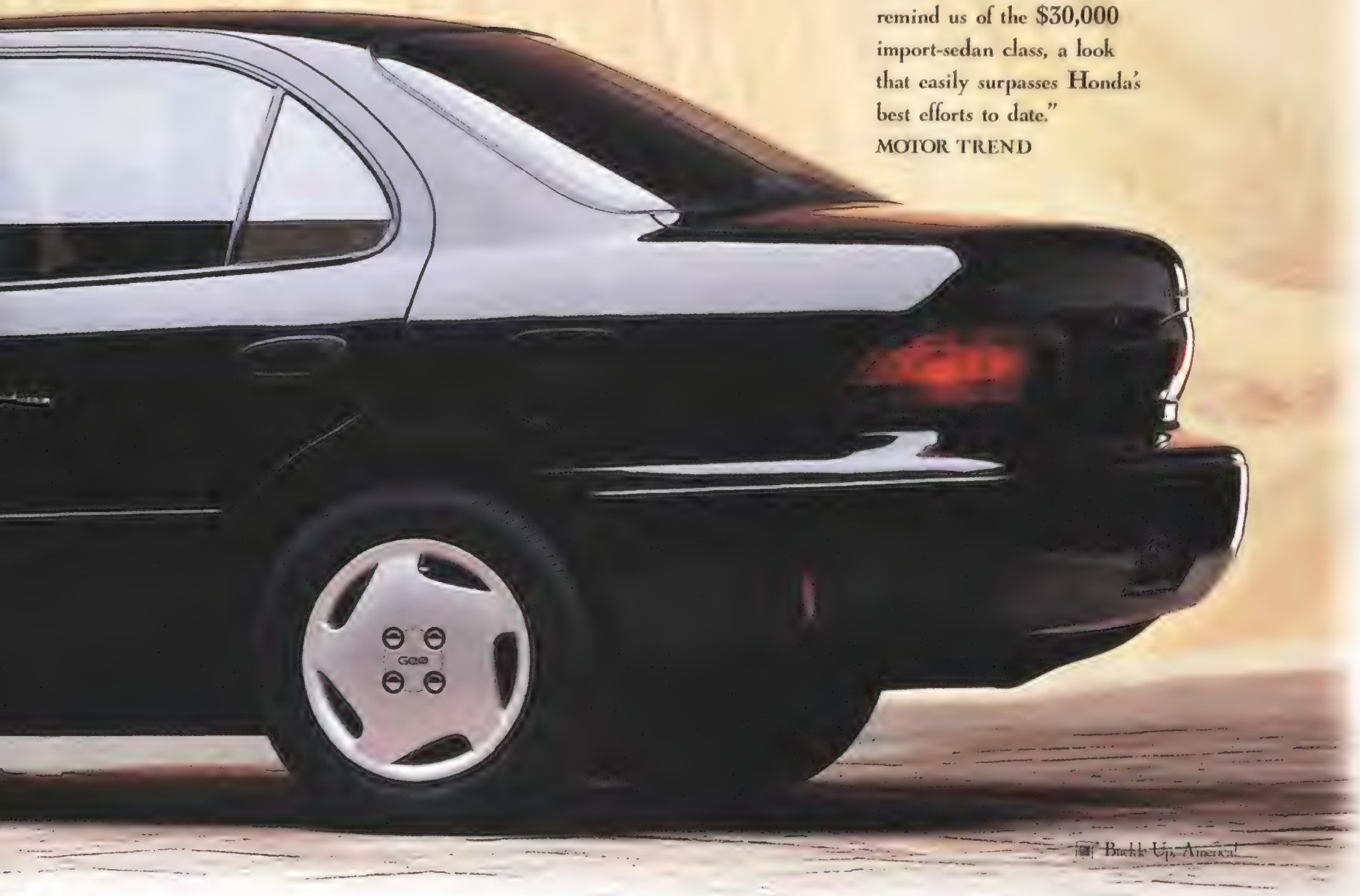

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By Don Lessem

'Weird wonders' fuel a battle over evolution's path

The Burgess Shale records the fantastic shapes that life took in the Cambrian explosion. Did chance determine which ones survived?

In the cool British Columbian summer, eight men have worked up heavy sweats, chiseling at the windswept flank of Mount Wapta, high above Emerald Lake in the spectacular Rockies of Yoho National Park. Shards of splintered, discarded shale tumble down the steep mountainside toward snowy alpine meadows. At last, one worker discovers what all the rock-splitters are after—a small, strange and handsomely preserved sea creature. To the workers and the lanky, soft-spoken paleontologist in charge, Desmond Collins of the Royal Ontario Museum, the animal isn't strange at all. Its finder proclaims, "a *Tuzoia*, straight from the *Tuzoia* zone." No bigger than his palm, this ancient sea creature is flattened, but its carapace is miraculously intact.

Several times this summer, however, as each year for nearly a decade, Collins and his crew will come across a fossil animal that neither they nor any scientist can identify. It will be a creature not seen on Earth for 530 million years, perhaps one that belongs to no known group of animals.

Each of the three quarries on this mountain slope that has yielded these mysteries is no longer than a city block. The first was begun nearly a century ago, though during much of the time since, it has been largely forgotten. But the other two are now under exploration,

Paleontologists work over shale, on what was once seafloor, in the Rocky Mountains of British Columbia.

Early in this century, Charles Doolittle Walcott holds an iron bar he used to pry free slabs of shale.

building upon this site's record for yielding a more diverse collection of animals than can be found in all the world's oceans today. These are truly bizarre organisms—some pineapple-shaped, others spiny, some with no apparent heads. One has five eyes and a frontal nozzle like a vacuum cleaner. Another, with no clearer a front end than Dr. Dolittle's Pushme-Pullyu, is aptly named *Hallucigenia*, and has been described as walking on seven pairs of struts. The largest, fiercest creature of this nightmare world is a two-foot-long predator with a toothy, circular jaw.

Such are the riches of the Burgess Shale, arguably the world's most beautiful and important fossil formation. Lately this band of rock and its spectacularly well preserved residents rest uneasily at the heart of a worldwide dispute being waged in the attempt to understand early life and the very mechanisms of evolution. New discoveries around the world have turned the Burgess Shale's odd animals upside down, sometimes literally. And sparks from the heated debate about early evolution reach not only the animals but their esteemed discoverer, one of the great scientists of the century.

These days, Des Collins is the only scientist permitted to dig the Burgess Shale. As such he inherits a mantle laid down by Charles Doolittle Walcott nearly 70 years ago and rarely picked up since. Walcott and his greatest discovery are the stuff of legend. Horatio Alger might have invented this small-town upstate New Yorker who grew up to become not only the world expert on early life, but fourth Secretary of the Smithsonian Institution, director of the U.S. Geological Survey, supervisor of American forest reserves, president of both the National Academy of Sciences and the American Association for the Advancement of Science.

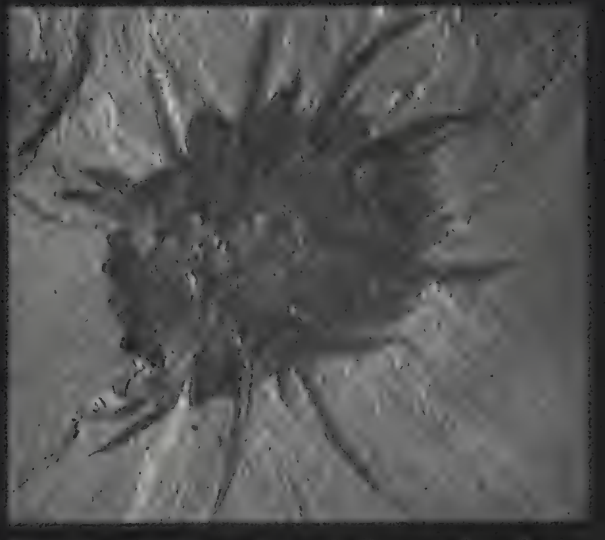
A discovery—and 60,000 specimens

Walcott found the first of a treasure trove of Burgess fossils in 1909 while on a working vacation with his family. According to legend, his wife's horse stumbled on a piece of fallen shale while traversing the Burgess Pass Trail below Mount Wapta. Walcott dismounted, split the rock and discovered an odd fossil. (It's more likely that careful prospecting brought Walcott to the site.) The next summer and for several summers after, despite the deaths of his wife in a train wreck and a son from consumption, Walcott and his children dug out a phenomenal number and variety of creatures—more than 60,000 specimens.

All had been singularly well preserved through an accident of prehistory. Long before the Rockies began thrusting from the western landscape in late dinosaur days, North America was part of a larger continent that sat on the Equator. What is now British Columbia was a coastal margin of that continent, and it teemed

Hallucigenia is correctly oriented with its "legs" seen as spines.

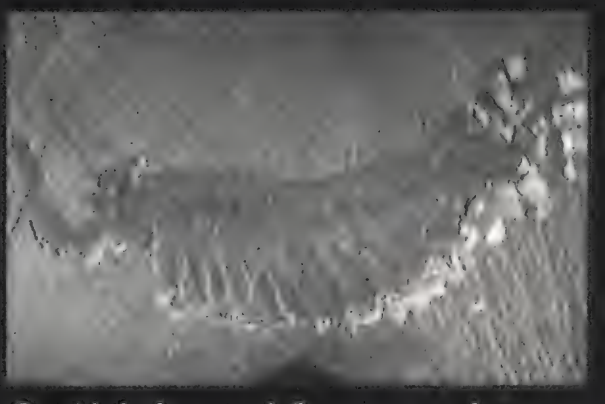
Arthropod *Marella splendens* ranged from one- to eight-tenths of an inch.



Wiwaxia, once a "weird wonder," turns out to be a polychaete worm.

First thought to be crustaceans, these are *Anomalocaris* feeding arms.

Olenoides was an everyday trilobite, probably a predator and scavenger.



Opabinia boasted five eyes, a long, armed nozzle and a segmented body.

with life. On disastrous days, circa 530 million B.C., mud slides from the edge of the continental platform likely engulfed a group of these seafloor creatures, suffocating them and sheltering them from decay. They remained hidden, though mountains pushed this patch of seafloor nearly 8,000 feet into the air, until the day Charles Walcott came upon them.

Walcott was 59 when he discovered the Burgess Shale. In the eventful years that followed, he was never able to devote extensive attention to documenting and interpreting all that he'd found. He knew these animals were among the earliest known, from shortly after the "Cambrian explosion"—a relatively sudden diversification of multicellular life into larger, more complex forms. Walcott speculated that the origins of animal life must lie several million years further back in the Precambrian. He categorized the Burgess Shale fossils as best he could into existing groups of more modern organisms before his death in 1927.

Don Lessem has written for SMITHSONIAN *on biologists and painters. His latest book is* Kings of Creation, *an account of the latest results in dinosaur paleontology.*

After Walcott, the Burgess Shale fossils lay in Smithsonian cabinets, available to scientists but largely untouched. Few would have thought to question the esteemed Walcott's findings, which was just fine with the most zealous protector of his reputation—his third wife, botanical artist Mary Vaux Walcott. Though Harvard University paleontologist Percy Raymond collected at the site in 1930, there was little call for Burgess Shale fossils for another three decades.

In 1966 and '67 Harry Whittington helped lead a Geological Survey of Canada expedition to the quarries (partly so Canada could have samples of its own treasure). By the mid-'70s Whittington and his two Cambridge University graduate students, Simon Conway Morris and Derek Briggs, had upset the Burgess applecart. Where Walcott had treated the creatures as flattened fossils, Whittington recognized the fossils as three-dimensional. He picked away their carapaces and illustrated them, using an early 19th-century invention, the camera lucida, to project microscope images onto paper for detailed tracing by hand.

After several years of meticulous study, Whittington and his students concluded that Walcott was wrong,

time after time, in his classifications of Burgess Shale animals. Instead, they found that several Burgess animals, including the multiple-stilt-walking *Hallucigenia*, were distinct oddballs, "weird wonders" not clearly related to any phylum of living animals. (All living animals can be divided into some 25 phyla. The Burgess Shale animals may represent 20 additional phyla.)

Celebrity for the Burgess Shale did not come until 1989, however, when paleontologist, historian of science and essayist Stephen Jay Gould published his best-selling account, *Wonderful Life: The Burgess Shale and the Nature of History.* The subject was apt for Gould, who has spent the past two decades, as he says, "walking through the ghost of the Burgess Shale." His cluttered cavern of an office on the ground floor of Harvard's Museum of Comparative Zoology was occupied before him by Burgess Shale explorers Percy Raymond and Harry Whittington. One of the finest collections of Burgess fossils aside from the Smithsonian's lies in wooden drawers outside the office.

Desmond Collins, who directs current Burgess Shale digs, closely examines a freshly mined sheet of rock.

To Gould the weird wonders of the Burgess Shale were Exhibit A in his case for the role of contingency in evolution. Mutation and survival of the fittest were long thought to be the chief agents of evolutionary change. Gould added another—chance—arguing that sometimes extinction and accidental survival factored in what was an "unpredictable and quite unrepeatable" chain of events responsible for modern life.

Gould rapidly summarized for me the evolution of his own and Whittington's thinking on the Burgess Shale: "Whittington and Briggs and Conway Morris began by assuming that they would find causes in conventional improvements in design for the survival of those who made it and the demise of those who didn't." The British scientists found no explanation for why some animals succeeded in leaving descendants in the fossil record, others none, according to Gould. As he told me, "after working on this problem for some 20 years, they have been forced to conclude that there is nothing they can see about those who survived which would predispose them for predictable survivorship."

For example, one Burgess Shale animal, the two-inch *Pikaia* with the faint hint of a midline down its back, may have been the ancestor of all backboned life. But to Gould, as to Whittington's team, *Pikaia* seems in no way superior to the weird wonders of the Burgess Shale that have since become extinct.

Was Walcott really that wrong?

In his book Gould stated his case for the importance of chance in evolution with a forceful metaphor: "Wind back the tape of life to the early days of the Burgess Shale; let it play again from an identical starting point, and the chance becomes vanishingly small that anything like human intelligence would grace the replay."

Gould's analysis was met with critical as well as popular success. It helped stimulate a number of inquiries into the nature and import of Burgess fossils and their near-contemporaries in the Cambrian Period. Yet not all of those findings supported Gould's views of the importance of chance in evolution, nor did they support his opinions of the Burgess fossils themselves and their discoverer, Charles Walcott.

Although Gould declared him the greatest scientist of his day, Walcott did not fare kindly in Gould's rewriting of the scientific history of the Burgess Shale: "Snatching defeat from the jaws of victory, Walcott . . . proceeded to misinterpret these magnificent fossils in the deepest possible way. He managed to shoehorn every single Burgess species into a modern group, calling some worms, others arthropods [the group that includes insects and crustaceans], still others jellyfish."

Gould's perspective of Walcott has been challenged by others who have studied Walcott's life, among them Walcott's successor at the Burgess Shale, Des Collins. Says Collins, "I don't think Walcott put everything into living groups because he was the arch-traditionalist conservative Gould suggests. Walcott followed biological practices of the time, just as you might expect of someone without any advanced biological training."

Walcott's import is not entirely academic to Thomas Clark, geology professor emeritus at McGill University and adviser to its Redpath Museum in Montreal. Tom Clark is 99 years old, and feisty. While an assistant to Percy Raymond on Raymond's first visit to the Burgess Shale in 1924, Clark met Walcott.

Of Gould's account, Clark says, "It made me furious to see that Walcott was so much maligned. He was a very fine man. Unfortunately, he didn't keep up satisfactorily with the biological relationship of some of the

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fossils that he found, so he had to put them somewhere, and he chose the nearest he could find."

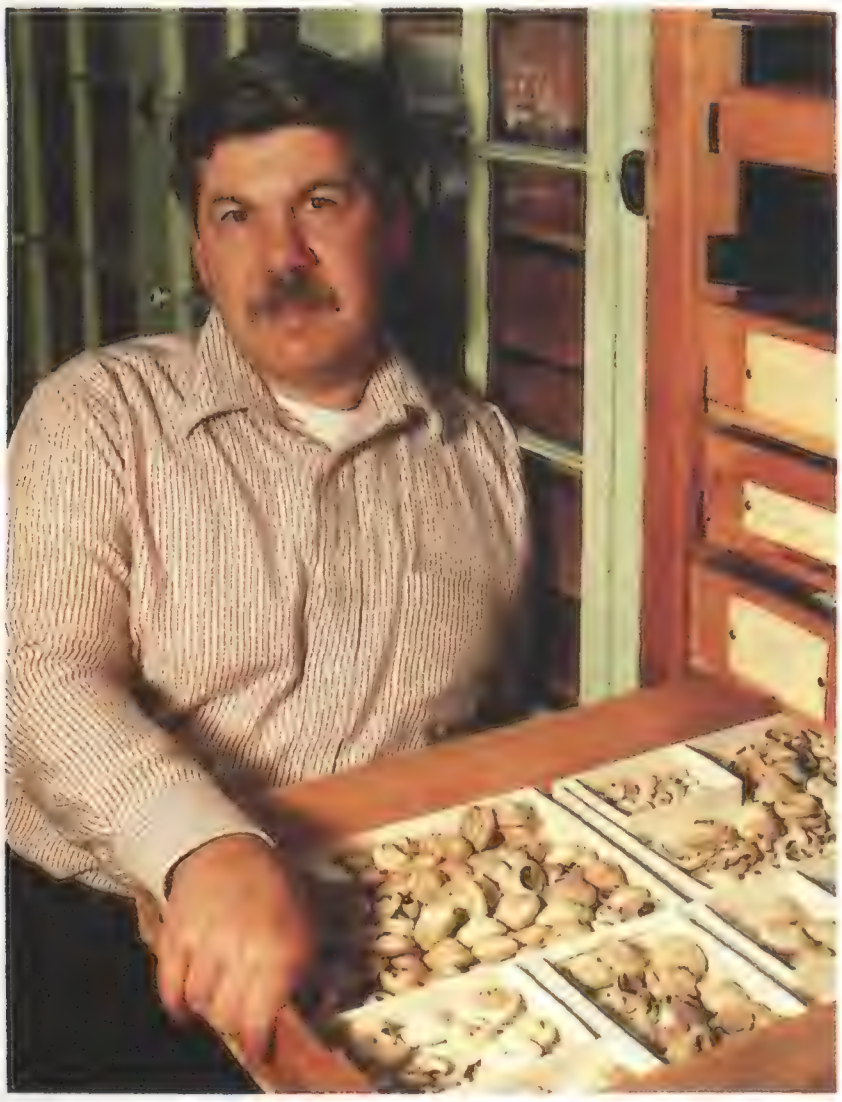
Clark communicated his ideas to Gould, who graciously journeyed to Montreal to hear Clark lecture on Walcott. Says Gould, "I was delighted to shake his hand and thereby touch Mr. Walcott in only one remove."

Meanwhile the dispute over Walcott's interpretation of the Burgess fossils, and those of Gould and other investigators of early life, rages as never before. Some researchers are suggesting that many of the Burgess Shale fossils are not so distinctive after all, and that life may not have been at its most varied so early in animal history, contrary to what Gould has contended. Chance may not have played so great a role, they argue, in which groups of animals survived and which died out early in the history of animal life.

Des Collins is one who thinks many of the weird wonders of the Burgess Shale will one day be placed within known groups of animals. "I already know that of the eight things that Gould mentions as 'weird wonders,' three of them I can classify, so that reduces the apparent effect of contingency."

There are two ways to figure out the evolutionary place of an animal: improve the methods for categorizing animals, or find new fossils that fill in the gaps in our understanding. Derek Briggs, now at the University of Bristol, has done the former. Briggs used a system known as "cladistics," which plots the relationships of animals according to their significant similarities, not by looking for important differences between animals, as paleontologists have traditionally done.

Harry Whittington views tracing of *Anomalocaris* maw, which Walcott originally misidentified as a jellyfish.



Stephen Jay Gould pulls out a drawerful of some of the snail shells he uses for his research on evolution.

Briggs is at work on a new method for comparing Burgess Shale animals with other fossils. "We can't always identify equivalent parts, but we can measure the number and shape of appendages, joints, carapaces, eyes. We're reasonably confident we'll have some success." It's Gould's view that the Burgess arthropods were very disparate in form, part of a community more varied than any today. Briggs is finding otherwise, and that life "was not substantially more disparate in the Cambrian after all."

Success for the detectives of early animal life has come in a more unexpected way—from rich new fossil finds. Though no Cambrian fossils to rival those of the variety of the Burgess Shale had been found since Walcott's day, discoveries in southern China and northern Greenland have lately begun yielding early animals that help to place the Burgess animals into a fuller account of early life.

While some 25 million years older than the Burgess animals, the Greenland and China fossils show many striking similarities to the Burgess fossils. The close relationships indicate that the Burgess creatures were part of a worldwide community of organisms when the seafloor was teeming with animals and the land was devoid of higher life.

And again, once-mysterious creatures have become clearer. One is the bizarre *Hallucigenia*. In May of

Magnifying glasses pushed up, Collins relaxes about 65 feet uphill from Walcott's original quarry.

1991, a Swedish and a Chinese paleontologist co-published their discovery of a *Hallucigenia*-like animal found in Yunnan, China, that indicated that the animal had previously been pictured upside down. Its supposed tentacles were conventional legs. Its so-called strutlike legs were in truth upwardly projecting spines along its trunk. Last spring, a Swedish researcher turned *Hallucigenia* yet another way, suggesting the animal had been depicted back-to-front, its head mistaken for its tail. *Hallucigenia* was no longer a bizarre nightmare. Rather, it was a member in good standing of a small group of wormy creatures, some of which are still alive today.

Collins spent January of 1992 in China examining the Yunnan fossils. He is unsure about the identity of *Hallucigenia.* But Gould and Conway Morris, who described *Hallucigenia* as walking on a single row of struts, are both convinced the "struts" are indeed spines. Says Conway Morris, "I'm just about sure they got it right and I got it wrong. In hindsight, I made a stupid mistake. That's how science works. Sometimes I prove other people wrong, sometimes they correct me."

Conway Morris and British colleague John Peel ventured into remote northern Greenland to find Cambrian fossils in 1989 and again in 1991. They've yet to publish on many of their finds, though last year Conway Morris affirmed that he'd found a relative of *Wiwaxia,* an elliptical-shaped weird wonder of the Burgess Shale, in Greenland. He originally thought it a possible precursor of mollusks. Not so, said one paleontologist, Nicholas Butterfield, then at Harvard; he calls *Wiwaxia* a member of a class of marine worms that lives today, the polychaetes. Conway Morris now thinks Butterfield may be right.

"The more we find," Conway Morris concludes, "the more we think the Burgess animals were really more mainstream guys. I think we'll fit in all the other oddballs eventually as ancestors or intermediates to other creatures." He adds, "Gould exaggerated the difference between Burgess animals and the importance of those differences. Contingency doesn't say much for me anyway. Suppose your parents hadn't met? Suppose you hadn't caught a bus? It's trivial. Evolution doesn't offer unlimited options. There are only a few ways you can be, and the end results turn out rather similar."

For his part, Gould disagrees. Like many scientists, he sees limitations to cladistics as a tool to sort out animals, particularly those that may be highly disparate, like those of the Burgess Shale. And new discoveries of Cambrian life point more to the strangeness of Burgess Shale creatures than to their familiarity, he argues. "Remember that there are a whole lot of Burgess oddities that have never been published. There's probably another half a dozen phylum-level anatomical designs. . . . So if anything, the roster of Burgess' peculiar creatures is going to go up, not down."

In his Montreal talk, as in my interview with him, Tom Clark invoked the image of a train as a metaphor for Burgess Shale research. It was Charles Doolittle Walcott who got the grand ride under way, but "unfortunately, on one of his trips he didn't notice that there was a switch open. He wasn't looking, and suddenly his whole train moved off the main track following this open switch and went into the wilderness."

Gould suggests that the potential for humans to

Simon Conway Morris studies blowup of a creature that made transition to the Cambrian, then died out.

evolve could also have disappeared down the wrong track. "If you will accept my argument that contingency is not only resolvable and important, but also fascinating in a special sort of way," he writes, "then the Burgess not only reverses our general ideas about the source of pattern—it also fills us with a new kind of amazement . . . at the fact that humans ever evolved at all. We came *this close* (put your thumb about a millimeter away from your index finger), thousands and thousands of times, to erasure by the veering of history down another sensible channel."

Amid the mountain goats on the slopes of Mount Wapta, Des Collins, supported by the Canadian Park Service and the National Geographic Society, is delighted to be a conductor of the Burgess Shale scientific train. Each summer produces new treasure. Collins and his team have worked the past two summers in Raymond's quarry. They have found 2,800 specimens, including a new relative of *Hallucigenia*, the first complete fossils of the era's largest predator—the big-mouthed *Anomalocaris*—and some jellyfish-like animals. Perched on the steep slope of Mount Wapta, Collins is exultant. "It may seem like convict labor we're doing, splitting stones, but there's a 'gee whiz' factor here. The next fossil slab you cut may be an entirely different animal or have answers to another weird wonder. The possibilities of life are so great here, there's no other place like it."

A sea of exotic life-forms

Undersea mud slides 530 million years ago trapped organisms like these; their fossilized remains are now in shale beds high in the Rocky Mountains. On the left side, turned so its circular mouth faces us, is the large predator *Anomalocaris*; another swims beyond it. In the lower right corner a *Pikaia*—noteworthy for its zigzag muscle bands and the visible precursor of a backbone—swims over a sponge. A mate is at left rear. Spiny *Hallucigenia* walk in lower left corner. Two animals at lower right that look a bit like pinecones stuck with flat leaves are *Wiwaxia*; first called "weird wonders," they are now considered polychaete worms. *Opabinia*, at lower right center, featured five eyes and a feeding nozzle. Fossils of all but *Pikaia* appear on page 109, along with one of *Marella*, at center bottom, which looks here like a shrimp-starfish hybrid, and at lower left, behind *Anomalocaris*, an ordinary trilobite, *Olenoides*. (The animals are not shown to scale.)

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No guts. No story.

By Donald Dale Jackson

Four hundred years after this Elizabethan pirate-patriot tried mining ore on Baffin Bay, archaeologists dig into traces of his work

Hot on the cold trail left by Sir Martin Frobisher

Truculent Frobisher, one of Queen Elizabeth's great captains, was knighted after defeat of Spanish Armada.

The seamen aboard the little wooden ship *Gabriel* stared out at a shoreline so harsh and dismal, so unpromising, that it seemed otherworldly, its barrenness alien to their experience and thus frightening, demon haunted. The bare, ice-encrusted land bordering the bay that would be named for their captain, Martin Frobisher, materialized in and out of the fog like some nightmare vision in white and gray. They were northeast of Hudson Bay, off Baffin Island in a stretch of water never entirely free of ice and navigable at all only for a few weeks each summer.

The idea that anyone could be alive on this terrible shore must have struck the roughhewn Frobisher and the 20-odd men on the tiny bark as inconceivable. Yet the seamen, scanning the misty shores of what they were already calling "Frobisher's Straits" from the *Gabriel*'s deck, were looking for signs of life. Native people, if such there were, might well know if this was the passage to the Pacific, as Frobisher thought it was, or if it wasn't, where they might find it.

It was August 1576. Frobisher was embarked on a voyage of what ultimately would become a 300-year quest—the search for the Northwest Passage. Born in the dream of a northerly route to the stunning wealth of Cathay and the Far East, the quest would mesmerize British mariners especially. Generation after generation, British captains sailed west in the conviction that somewhere north of the forests and river valleys of Canada lay a passage leading to the Pacific; it *had* to be there, and it had to be navigable—it was simply a matter of finding it.

Martin Frobisher was the first Englishman to try. British history knows him—along with Sir Francis Drake and Sir John Hawkins—as one of the great patriot seamen of Elizabethan England, whose final gift to Queen Elizabeth I would be the victory over the Spanish Armada in 1588. His father died when he was about 5. He grew up in Yorkshire, and by age 11 was already a big, rebellious, aggressive boy whom his mother couldn't handle. He went to sea in the Africa trade at 15, and by his early 20s was a ship's captain who made a name for himself as a trader and pirate. In those days pirates were often hanged from gibbets, but

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Queen Elizabeth I invested heavily in the third voyage to Frobisher Bay.

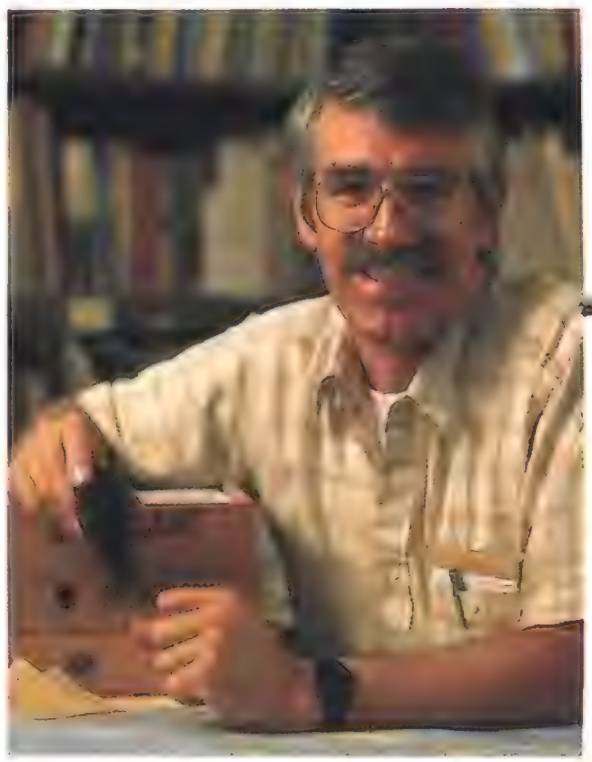
like Drake and Hawkins, Frobisher's booty—gold, pepper, dyes, sometimes slaves—more often than not came from ships flying the colors of Spain or some other enemy of England.

It was a touchy business, of course, because Elizabeth, wanting to keep the peace with His Most Catholic Majesty Philip II of Spain, protected England's interests with charm and guile. Frobisher was often accused of piracy by Spain and brought before the courts of law so that Elizabeth, to placate Philip, could say that her English "pirates" were being pursued under English law. But usually Frobisher was soon free again, fitting out a new ship, sometimes armed or victualed by the queen's services.

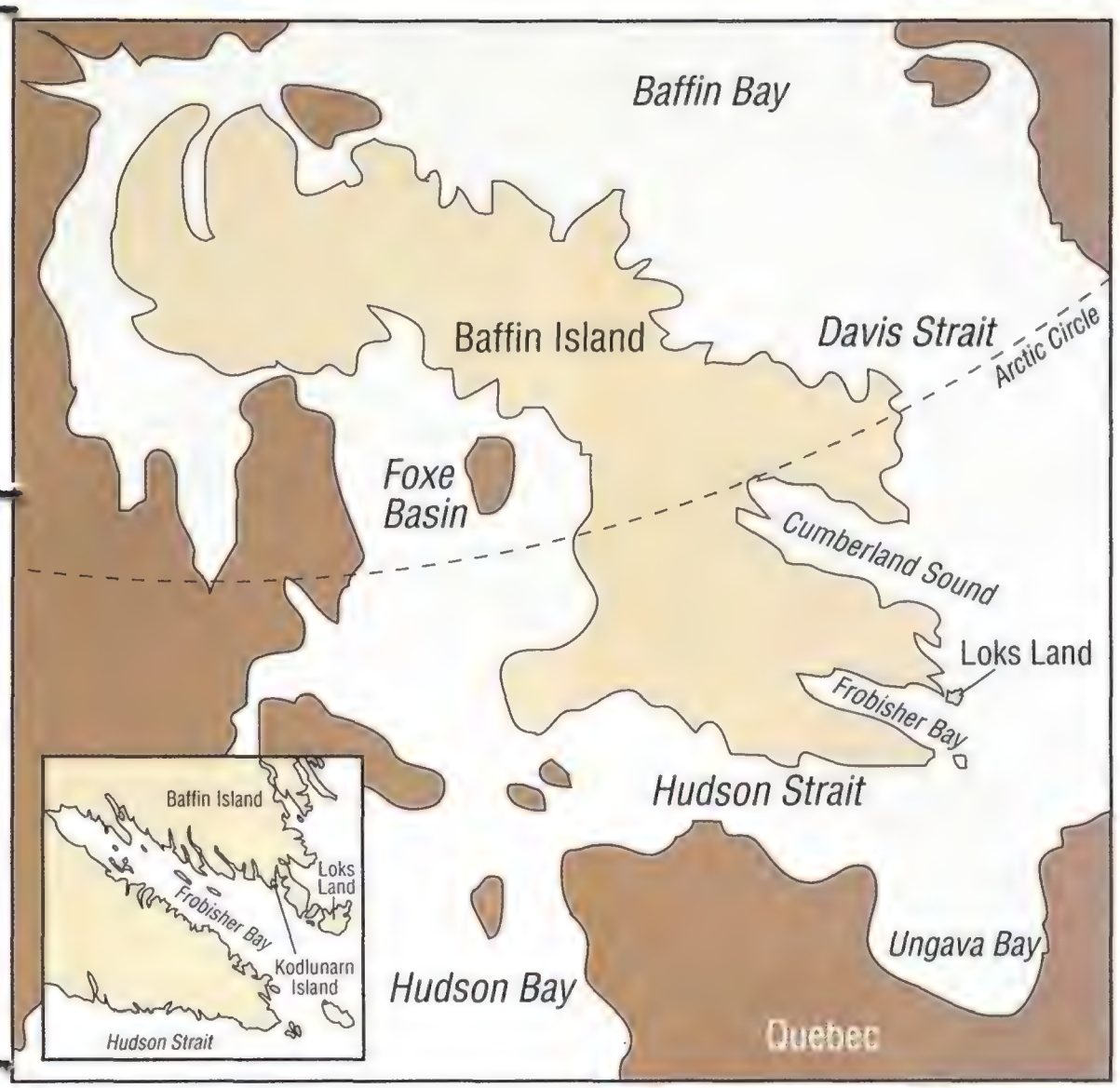
Through the years the dream of the Northwest Passage fascinated him. In the early 1570s, with the support of a merchant named Michael Lok he managed to raise about £875 for a voyage and three ships. Eighteen men invested, and Lok agreed to pay any overruns. The aim was wealth. As Frobisher's fellow seaman and chronicler George Best noted, merchants have no use for virtue "without sure, certayne and present gayne." But to Frobisher, as Best explained, finding the Northwest Passage was adventure, "the only thing of the world that was left yet undone."

Early on in the trip, one of his ships had sunk with all hands in a storm. The captain of the second grew frightened and sailed back to England. But here the *Gabriel* was, after eight days, exploring a bay no European had ever seen. And, astonishingly, there were people. On August 19, crewmen rowed a skiff to an island on the north shore. Suddenly, some Inuit in kayaks emerged from the rocks and greeted them without hostility. The next day, the sailors traded bells, knives and looking-glasses for sealskins and polar bear hides. The Inuit men climbed aboard the *Gabriel* for a friendly visit, and the English seamen marveled at the acrobatic feats they performed in the ship's rigging. But the cordiality of the initial meeting did not last. Five of Frobisher's men, curious about the Inuit and anxious for another barter session, rowed ashore the next day—and promptly vanished. Two days later, a foot of snow fell and the time to weigh anchor was near at hand.

The *Gabriel* fired a cannon salvo



Smithsonian's William Fitzhugh holds a sample of rock that fooled alchemists.



Map shows the area of Frobisher's mining operations in the 1570s. The surrounding waters are blocked by ice for most of the year.

and sounded the ship's trumpet in a vain attempt to raise the missing men. A search was impossible as the men had taken the only boat. Hopes revived when several Inuit approached the ship in sealskin kayaks (SMITHSONIAN, November 1992), but now they kept their distance.

Frobisher, one biographer claimed, was "a man of strange oaths." He appears to have been a man of few words, in writing at least, perhaps because even by Elizabethan standards he was an atrocious speller. His name on documents appears in six or seven versions, including "Furbiser," "Frobiser," "Furbisher" and even "Ffourbyssher." He was noted, though, for his "bould courage and naturall hardnes of body," a man of action who could and did cheerfully pick up a rebellious sailor and heave him over the side. Now he lured a kayaker alongside the ship by dangling a bell just beyond his reach. When the man came close enough the powerful Frobisher seized him and, in Best's words, "plucked him with main force, boat and all . . . out of the sea." To Frobisher the man was a potential guide for future expeditions and an exotic specimen to display back in England.

He needed all he could get. When he had sailed past Queen Elizabeth's court at Greenwich on the Thames at the outset of the voyage, receiving a distant wave from the royal hand, Frobisher had commanded a fleet of three frail-looking vessels—two barks of about 20 tons each and a 10-ton pinnace. The queen approved the voyage while prudently declining to invest in the company. And so far, the trip did not look like a success.

The other two vessels were gone.

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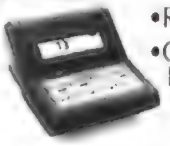

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And though on July 28, sailing between 62 and 63 degrees north latitude, Frobisher had spied the northwest-bearing body of water he decided to enter and name for himself, in the three weeks since then he had managed to beat his way less than 50 miles farther northwest (see map) and now, with winter weather settling in, he was about to be forced home, without his five lost sailors.

On the homeward voyage in September, the *Gabriel* carried not only the man whom Frobisher had muscled aboard but also a collection of wildflowers and a single black, coal-like rock the men had gathered as a "token of Christian possession." The stone would soon transform all aspects of the Frobisher expedition.

Their arrival in London on October 9 occasioned "great admiration of the people"; at a time when Spanish and Portuguese seamen were still the world's most celebrated explorers, transatlantic voyaging was new and thrilling stuff in England. The great wonder, however, was the Inuit hostage, who attracted the attention of both painters and sculptors in the scant few weeks he remained alive. Best attributes his death to "cold which he had taken at sea."

Frobisher gave the black stone to Lok, who had it assayed for mineral content. The assayer reported no precious metals. Lok tried another assayer, and then a third with the same result. It is here that the first of several intriguing mysteries about Frobisher's voyages—still of interest to archaeologists—surfaces. With three negative assays in hand, Lok tried yet another assayer, an Italian named John Baptista Agnello, who doubled as an alchemist. Agnello said that the stone contained gold. When Lok asked why the other assayers had missed it, Agnello replied enigmatically, "One must needs know how to coax nature." Tragically for Frobisher and his backers, events would ultimately show that Agnello

Inuit woman with baby, and male hunter, were brought back by Frobisher and painted by John White. In England all three soon took sick and died.

coaxed nature beyond its capacities—the stone was worthless.

Researchers who have studied the Frobisher record are still not sure if this was chicanery, and if so, on whose part. Was Agnello a fraud or an incompetent? "I can't help but think it was fraud," says Donald Hogarth, a University of Ottawa geologist and an authority on the Frobisher voyages. Hogarth's own experiments have shown that the supposedly gold-bearing rock was in fact amphibolite flecked with mica, which turns golden when heated. Other researchers, such as Smithsonian archaeologist William Fitzhugh, codirector of a U.S.-Canadian project aimed at learning more about the Frobisher voyages, are exploring other mysteries. Among them: the question of what became of the lost crewmen, what kind of tools and culture the Inuit had, and what the result was of the interaction between the native people and the English.

After the first upbeat assay, there was never any doubt that there would be a second voyage. The prospect of an English treasure trove in the New World to rival Spain's banished any hesitation. Aristocrats with guineas to spare now hurried to invest. Even the normally tightfisted queen subscribed £1,000 (of the £4,400 needed) and loaned Frobisher an imposing 200-ton ship named the *Ayde*. Frobisher and Lok formed the Company of Cathay. Lok was named Governor, Frobisher High Admiral.

The company's list of instructions from the queen directed Frobisher to load miners, soldiers and sailors onto three ships—the *Gabriel*, the *Michael* and the *Ayde*—and to bring back as much "ore" as they could carry. If time permitted after the main business of digging gold was done, he was to try to retrieve his missing men and explore the presumed passage to Cathay. With the ships' holds filled with preserved meat, biscuit, rice, peas and enough

The author, a frequent contributor, is often farflung, but has never tried to find the Northwest Passage.

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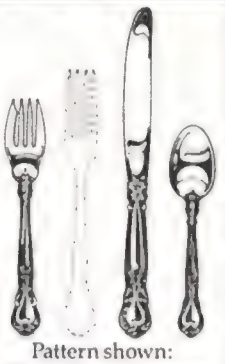

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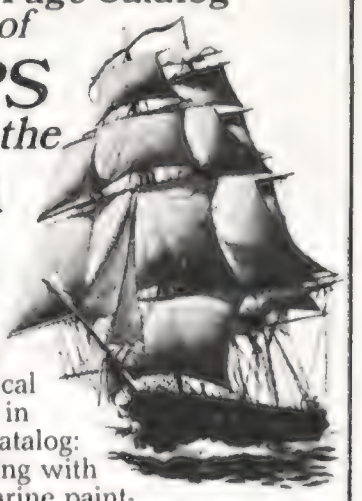

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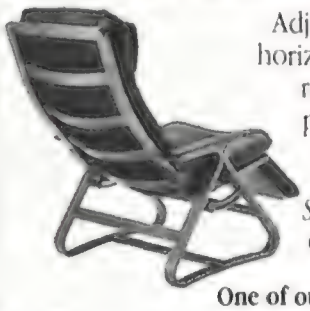

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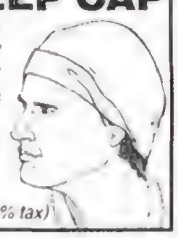

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beer to supply each of the 143 men with a gallon a day for six months, they set sail on May 26, 1577.

By July 19 they were at the entrance to Frobisher Bay and already in new trouble with the Inuit. Spotting a group waving from a hill, Frobisher and another officer went ashore and persuaded two men to parley. While the Inuit were affably exchanging goods, the Englishmen suddenly grabbed them, intending to take them hostage, but the captives freed themselves and ran for their bows and arrows. One arrow hit the retreating Frobisher in the buttocks, causing him to flee "rather speedily," Best noted. Storming ashore to help, Frobisher's men managed to seize another Inuit hostage.

Ten days later the *Gabriel* sailed into Countess of Warwick Sound on the northeast side of the bay and found the tiny (350 by 400 meters) island that would henceforth be their headquarters. The miners set to work digging "black ore" while Frobisher and the soldiers kept an eye out for Inuit.

The *Michael*, meanwhile, farther down the bay, had found a deserted village. In one hut were clothes that belonged to the missing comrades. When some Inuit appeared, a violent skirmish erupted. The English, armed with both bows and matchlock guns called harquebuses, killed several Inuit and gaped in astonishment as others leaped to their deaths from a cliff rather than be captured. When the fighting was over, Frobisher's men held three more hostages—an old woman, a mother and her infant child. But the old woman looked so much like "a devil or a witch" to the English that they nervously let her go.

Still hoping his lost men might be found alive, Frobisher left a letter for them with a group of friendly Inuit. For their safe return, he wrote, he was willing to exchange his hostages or anything else he had on his ships, "which I will not spare for your sakes." There was no reply.

By August 21, 1577, the exhausted

The mystery of this iron "bloom"—how could it predate Frobisher's arrival?

work teams had loaded 200 tons of presumed ore onto the ships. All were "wel wearied." On the 24th the rocky headlands at the bay's entrance were once again astern of them as they headed east toward home. By now, exploration was all but forgotten.

This time they returned as heroes, parading through the city of Bristol to the sound of trumpets and roaring crowds. The precious ore was taken to Bristol Castle and the Tower of London to await construction of a furnace to melt it for testing, but none save a few crotchety assayers doubted that it would be a rich lode. Queen Elizabeth invited Frobisher down to Windsor, receiving him with copious expressions of regal gratitude. The investors—"venturers," they were called—were more than willing to underwrite the cost overrun on Voyage No. 2 and to up the ante for Voyage No. 3.

The English were intensely curious about the three hostages brought back by Frobisher—the man, and the woman and her infant son. Painters depicted them in their sealskin suits and boots, with the child peeping out of his mother's hood. The man, whose name was given as Calichough, displayed his notable talents as a kayaker, and at a party given by the mayor of Bristol, bagged a pair of ducks with his bird dart. Sadly, both the man and the woman died within six weeks of

their arrival in Britain, and the child survived them only briefly. The man's death was blamed on an "uncurable ulcer of the lung."

The early assays on the rocks from the second trip, though favorable, were inconclusive. "Assay values kept declining," Donald Hogarth reports. But confidence stayed buoyant enough to support what would turn out to be the largest naval armada used in an expedition to the Arctic, before or since. When the last vessel was caulked and the last keg of beer stowed by late spring of 1578, Admiral Frobisher had 15 ships and at least 397 men. Crew manifests list sailors, soldiers, miners, surgeons, smiths, carpenters, musicians, ministers, a "geometrician" and "gentlemen" not further identified (perhaps investors?). At least one crewman was not who he said he was. "The Spanish had a spy aboard," Hogarth reports. "The British published Spanish state papers which confirmed it in around 1900. He was supposed to get ore samples and a map."

Orders called for the establishment of a colony of 100 men who would winter on small (about 15 acres), barren, low-lying Countess of Warwick Island (now Kodlunarn, from the Inuit, "white man's island"). Summoning Frobisher and his captains to court, Queen Elizabeth placed a gold chain around the commander's beefy neck and bade them all a gracious bon voyage. On May 31, 1578, they hauled anchor and sailed west again.

The third trip was star-crossed from the start. Off Greenland the "hideous mist" was so dense that sailors pounded drums and blared trumpets to keep the fleet together. One ship collided with a whale, and when they approached Frobisher Bay in early July they found it blocked by "walles, mountaines and bulwarkes of ice," one of which slashed a hole in the 100-ton bark *Dennys*, sinking it. The crew was rescued but not the section of the prefabricated house the ship carried for the colonists.

The storm that then beset them was

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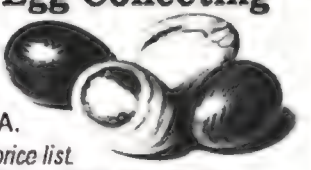

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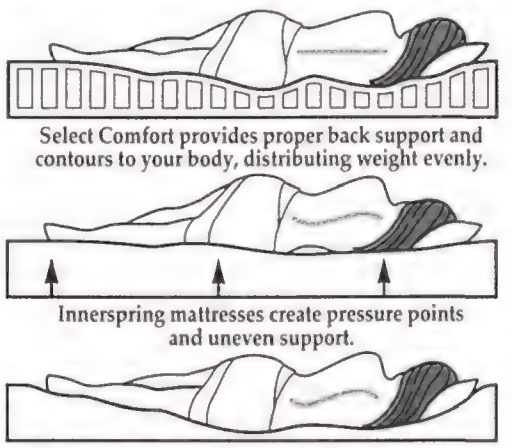

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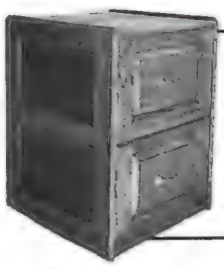

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the most terrible they had yet experienced. For one "dismal and lamentable night," crewman Thomas Ellis wrote, they remained "plunged in this perplexity, looking for instant death." When it finally eased, instead of entering Frobisher Bay they got lost nosing up into Hudson Strait. "If they had kept going," says the Smithsonian's William Fitzhugh, "they probably would have been lost forever in the ice like Sir John Franklin was in the 19th century" (SMITHSONIAN, June 1985). "There is more trouble as you go farther inland. They were lucky. Frobisher Bay, though north of Hudson Bay, is, relatively speaking, a pocket of paradise. It's milder than the alternatives on either side."

The bulk of the fleet reached Kodlunarn at the end of July and began digging and testing "ore" from several sites on Countess of Warwick Sound. Understandably wary by then, the Inuit gave them plenty of room. There was no sign of the five missing sailors.

Frobisher's most urgent problem was deciding what to do about the colonists. Part of the lumber for the settlement had already gone down with the *Dennys*; the carpenters said it would take two months to build the necessary structures. It was already August—time was too short. Fortunately for the would-be settlers, the admiral chose to forgo the colony.

Their ships were in constant danger of being iced in. Tempers frayed. Normal shipboard mutterings edged close to mutiny; the pilot on one ship seized command and, with the crew's backing, sailed home to England. Worst of all, leakage had drained away most of the beer. "To their great griefe," George Best reported, the rest of the men were forced to drink "nothing but water."

By the end of August they had loaded 1,136 tons of Arctic rocks. They built a stone watchtower on the island's high point and filled it with a curious hodgepodge of gifts for the Inuit—bells, whistles, pipes, small lead statues, even freshly baked bread,

This fanciful depiction of Frobisher's fleet and his mining operation on Kodlunarn Island during 1578 includes boatbuilding, digging and smelting.

"the better to allure those brutish and uncivill people to courtesie against other times of our comming." They left a cache of timber and other stores for their anticipated return the next year. With an optimism bordering on lunacy, they planted peas and corn in what little pebbly soil they could find. (In 1991 a Canadian research team found some peas still in the cache, but these were part of the food supply that was left behind.)

Their business done, they departed on September 1, only to be whacked immediately by another ferocious storm. Two days later the last of the battered, and now separated, ships limped past the headlands and headed home, where trouble of another kind awaited them.

Opinion in England had shifted in their absence. The final assays from the second trip had all come in negative. There were no trumpets or parades for the returning heroes—some weren't even paid. The backers of the Company of Cathay had lost faith in Frobisher's "gold." "There was no bombshell exposé," Fitzhugh says, "just a kind of slow fade." The giddy hopes of spring now dissolved into a winter of discontent, a sordid round of lawsuits, recriminations and name calling. The venturers were no longer willing to cover the inevitable cost overruns, which left Michael Lok holding the nuggetless bag.

Lok tried to deflect the blame to Frobisher, pointing out, among other things, that the admiral took several more ships on the third voyage than the company had authorized. Frobisher responded with a characteristic lack of diplomacy: Lok, he stormed, was a fraud and a knave. Now bankrupt, Lok went to jail. Frobisher lost what money he had. Even before the third voyage was over, his wife, describing herself as "the most miserable poor woman in the world" and claiming that she and her children (by a previous marriage) were starving, had to petition the queen's privy council for some relief until his return. But Frobisher, because he was so formidable a sea fighter, managed to emerge with only a gentle reprimand, his reputation largely unsullied.

Elizabeth soon recruited him to help put down a new revolt in Ireland, where he fought alongside the likes of Sir Walter Raleigh and poet Edmund Spenser, author of *The Faerie Queene.*

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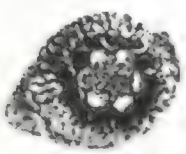

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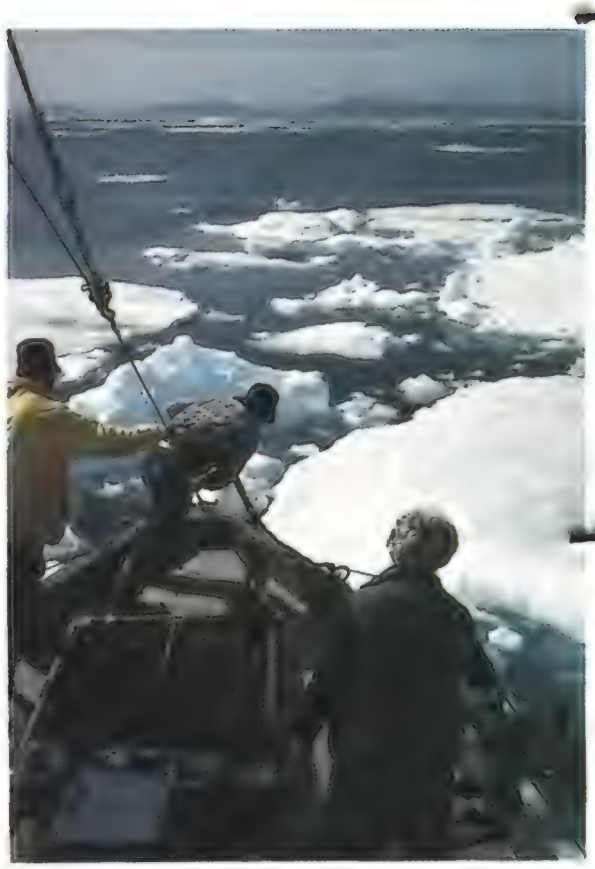
Later he began to plan a fourth voyage to Cathay, this time around the Cape of Good Hope.

By 1587, as war with Spain loomed, Frobisher had command of a 25-ship fleet guarding the English Channel. The next year, when after much delay the queen agreed to risk a raid against the Armada in hopes of destroying it before it sailed, Frobisher, then in his late 40s, was given command of the largest ship assigned to the task. The Armada got to sea anyway, but in the dodge-and-run sea battles that followed, Frobisher was one of the foremost captains. He was knighted for it. He died in 1594.



Even in summer, boat passage is difficult around Frobisher Bay.

Fast-forward through history. Sir Martin Frobisher has faded into the Arctic mist. Though the Cathay Company's legal and fiscal failure produced innumerable court papers making the Frobisher Expedition one of the best documented voyages of the Age of Exploration, scholars still disdained his exploits because, unlike the Columbus or Magellan ventures, to name two, the thrust of Frobisher's energy and enterprise didn't lead anywhere. Historians didn't even know where he went on Baffin Island.

It is 1861 and Charles Francis Hall, a gritty American journalist-explorer who would one day lead a North Pole expedition, is sailing around Baffin looking for signs of Sir John Franklin and his men, who in 1846 vanished in search of the same Northwest Passage that eluded Frobisher.

The local Inuit tell Hall about a group of white men who visited their shores many years before. The story was passed down from their ancestors. The men made their camp at the island the Inuit call Kodlunarn. Intrigued, Hall visits the island and finds chunks of coal and an iron "bloom," a piece of smelted but unfinished iron. He discovers what looks like the remnants of a mine and a stone structure. The Inuit tell him that five white men wintered on Kodlunarn and built a ship. When they sailed out into the bay they got stuck in the ice and froze to death. Hall tells the story in his book *Arctic Researches and Life With the Esquimaux*, and sends various artifacts to the Royal Geographic Society in London; the bloom, with additional relics, goes to the Smithsonian.

Fast-forward again, this time to 1964. Frobisher has once more receded into history's shadows. Wilcomb Washburn, a Smithsonian historian, stumbles on Hall's iron specimen in a storage area. He later learns that the other Kodlunarn material Hall gave the museum was thrown out during an overzealous housecleaning in 1953. Washburn has the iron fragment radiocarbon dated. When the dating analysis is completed it raises a new mystery: the bloom dates to the years 1160-1400—well before Frobisher. Light bulbs and intriguing hypotheses flicker on and off. Could Norsemen have left it there?

At this point the thickening plot attracted the interest of archaeologist Fitzhugh, director of the Smithsonian's Arctic Studies Center. In 1981 Fitzhugh organized an expedition to Kodlunarn, during which more iron

blooms were found and the sites of several structures tentatively identified: the stone house or watchtower, a longhouse, an assay office, a trench or mine, and a smithy. But when the new iron finds were analyzed they yielded the same conundrum: the dates were too early for Frobisher.

Fitzhugh found evidence that Frobisher's ships carried iron for making and repairing tools. Iron-dating analysis examines the embedded carbon residue from coal or charcoal to establish an iron object's vintage. Maybe the wood that produced the charcoal in England went back to the 1200s, he reasoned at first. But some of the wood is from conifers not found in England. It must have come from the Far North. Fitzhugh doesn't buy the Norse hypothesis, though. He thought that the wood could have been ancient driftwood, frozen in the ice pack of the Arctic Ocean, which was released when the ice melted.

Then new radiocarbon dating of the blooms produced an interesting result: the exteriors of the blooms gave the same early dates, but testing of the blooms' interiors produced Frobisher-era dates. "This was where they camped and worked. We've now found four blooms in one place. They had coal and charcoal," he says. "The iron has to be connected with Frobisher."

Fitzhugh, who investigated the island in 1990, 1991 and 1992 with Hogarth, Reginald Auger and other scientists, has developed a hypothesis that attempts to explain the main puzzles that persist in Frobisher's wake (besides the original nature-coaxing assay by John Baptista Agnello): the iron dates and the Inuit tale about white men building a ship. He found a vague suggestion in one mariner's journal that a boatload of men was left behind at the end of the third voyage when they became separated from their ship in tempestuous Countess of Warwick Sound. The facts were covered up, he ventures, to avoid lawsuits back in England.

In Fitzhugh's scenario the aban-

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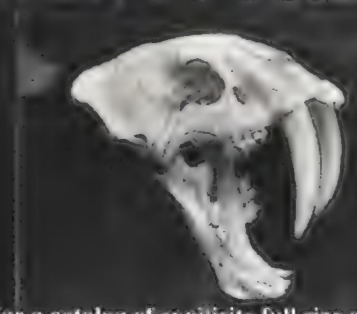

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doned sailors return to the island and build a ship, using the iron and wood Frobisher left behind. The Inuit accounts seem reliable, even so long after the fact, in part because their description of what Frobisher did matches the English records as to number of ships, number of voyages and work undertaken. The five men mentioned in Inuit oral history could not be the five who disappeared on the first voyage, he notes, because Frobisher didn't find Kodlunarn until his second trip. The Inuit told Hall in 1861 that they had helped the men survive the winter, and in the spring they built their ship in the "ship's trench" where the blooms were found. Doubtless eager to set sail, they may have sealed their grim fate by leaving before the sound was clear of ice. Fitzhugh now believes that the blooms may be "yron stones from Russia" which were mentioned on Frobisher's manifest. Carried as ballast, they were abandoned on Kodlunarn Island. The stranded sailors may have tried to smelt the blooms using coal left by Frobisher. A coal fire can contaminate iron so the exteriors of the smelted blooms would date earlier than the interiors.

Only archaeology, Fitzhugh believes, can hope to prove or disprove his theory. "The deposits we find may tell us if Englishmen wintered on Kodlunarn eking out a living, tried to build a boat or attempted to smelt iron." Additional work in English archives may help too. Kodlunarn digs will continue to help flesh out the Frobisher file, Fitzhugh adds, providing a three-year window on the technology and the assaying process of Elizabethan England during this misguided attempt to create a settlement in the New World.

The downside is weather and polar bears. Just as in Frobisher's day, boats can get in and out of his bay for only a brief period each year. At one point in 1990 the research team's 50-foot power boat was trapped in ice and rocked by 30-foot tides. As for bears, the one that tried to climb aboard their boat was unintimidated by rifles fired in the air and departed only when a blast of engine exhaust hit it head-on. For Auger, "bears are why I sleep badly in the Arctic."

Bears and weather permitting, the archaeologists figure, the full story of Martin Frobisher's dramatic and ill-starred adventure in the New World should be known in two or three years. If the finds thus far are any guide, it should be worth the wait.

Research team member Eric Loring and Inuit guide Pauloosie Pishuktie inspect a trench on Kodlunarn Island dug by Frobisher's miners 400 years ago.

Book reviews

Dickens
Peter Ackroyd
HarperCollins, $35/$16 paper

The Invisible Woman: The Story of Nelly Ternan and Charles Dickens
Claire Tomalin
Knopf, $25/Vintage, $13 paper

The abundance of Dickens is a psychological fact as well as a physical one. From what kind of man could such a world of characters, such a profusion of prose, have flowed? Psychological abundance is what G. K. Chesterton had in mind when he said that Dickens' novels are not novels at all, but "lengths cut from the flowing and mixed substance called Dickens—a substance of which any given length will be certain to contain a given proportion of brilliant and of bad stuff." There is no other English author of whom such a thing might usefully be said. The abundance of Dickens is psychological in another sense too. We are all primitives in the belief that for divine abilities a human price must be paid. "The life of almost any man possessing great gifts," Dickens once wrote, "would be a sad book to himself."

On the surface, Dickens led a crowded, boisterous, public existence, a life so busy and full that if you did not understand his inner compulsions, you would wonder how he found time to write. But his was also a life of astonishing privacy. To his study, to his fevered walks, to his inward self-dramatization he devoted the greater part of his prodigious energies. And so we are blessed with an abundance of Dickens—novels, stories, journalism, letters, as well as the reminiscences of friends and contemporaries —abundance enough to make the reader hope that even now Dickens might somehow be captured in essence. But when we turn to his biography we see the utter intangibility that lies in each of us, living or dead. Because of the special claims Dickens makes on our affections, one would like a biography of him to do the impossible: to capture the liveliness of his mind as it appeared to itself.

That is largely the task that Peter Ackroyd, scholar and novelist, has set himself in his new biography of Dickens. By convention, Ackroyd is obliged to narrate the life from start to finish, but he is more interested in what might be called the missing actuality of Charles Dickens. The outline of Dickens' life is of course familiar to most readers: John Dickens' slow descent from respectability into debtors' prison; his son's degrading labors in a blacking factory; Charles Dickens' swift fame following the publication of *Sketches By Boz* and *The Pickwick Papers*; the great, if not stately, succession of novels; the separation from his wife, Catherine; the almost frantic shuttling to and from the Continent; the reading tours, also frantic; and then, as Ackroyd reminds us, the man who died unconscious, weeping, as if in his final moments he saw himself with the full powers of his self-pity. What Peter Ackroyd rescues for the reader is not the life of Dickens in all its detail—there are better biographies than this one for the chronological stuff of his day-to-day existence. What Ackroyd rescues is the character of Dickens.

This involves some risks. It means that this biography is also, in part, a work of imagination. Ackroyd never departs from the facts as they are known, but he displays an uncanny ability (uncanniness is one of his favorite qualities in Dickens) to wonder about the meaning of those facts. Ackroyd is particularly good at crossing the boundary between Dickens' fiction and his life. He does this not only to show how the novels illuminate the life, but also to understand the transforming powers of Dickens' imagination. That they were great powers, capable of altering Dickens' own sense of reality as well as the reader's, is not in question.

It is good to have a novelist's biography written by a novelist. At times Ackroyd seems to lead you through the workshop door, where, for a moment, you can see the final adjustment being made to a small piece of melodrama or the scaffolding being erected for one of Dickens' colossal London set pieces. The complexity of Dickens' imagination is always before us in this biography, and it feels—such are Ackroyd's strengths—like a living imagination, not an entombed one. "It is agreeable," Ackroyd writes in a typical passage, "to mark off the stages of Dickens's progress, but it is hard to find any real evidence with which to do so. The development of a novelist can really best be understood, not in terms of his 'moods' or even of his 'themes,' but rather in that slow process of experimentation and self-education which changes the techniques of his prose."

But this book has its flaws. From the start of this very long biography, Ackroyd tries to keep before the reader an image of the character of Dickens as it appeared in its wholeness at the peak of his career. Inevitably, this becomes repetitious. More irritating still are the verbal tics that characterize Ackroyd's writing. You can only wonder why he loves so dearly to use sentence fragments, which are like felled trees in the reader's path. And never since the decline of high-Victorian public oratory has a piece of prose been so driven by rhetorical questions as this book. "Can we see the head of John Dickens," Ackroyd writes in an overheated moment, "monstrous as if in a Dali painting, looming over the streets of the metropolis as Dickens walks them?" This kind of thing gets old very quickly.

Ackroyd demurs when it comes to the woman named Nelly Ternan, who is the subject of Claire Tomalin's interesting work, *The Invisible Woman*. After the blacking factory where Dickens worked as a child, Nelly Ternan is the great mystery of his life. She was the youngest daughter of a provincial acting family and appeared with Dickens in *The Frozen Deep*, which he wrote with Wilkie Collins. From 1857, when she was 18, until his death in 1870, Ternan was also Dickens' mistress, or perhaps not. Rumor made much of her at the time, but not nearly as much as it might have done had she not remained, as Tomalin has it, invisible.

Tomalin concludes that Dickens and Ternan were indeed man and mistress and that perhaps a child was born—and lost—to them. Ackroyd, not surprisingly, asks, "is it too fanciful or extravagant to suppose that his love for her was all along as pure as it was obsessive?" Both

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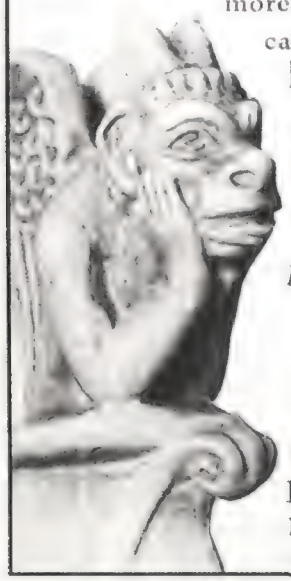

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Tomalin and Ackroyd rest their arguments on probability, Tomalin on the probability of normal—that is, flawed—human behavior, Ackroyd on the probability that Dickens would do something improbable, especially involving love.

To be sure, Tomalin has pieced together every tantalizing fragment that she can—*An Invisible Woman* offers all the pleasures of a literary detective story. The author makes a plausible case that Nelly was indeed Dickens' mistress, cosseted and concealed from view in conditions of modest luxury, for 13 years. We are offered an intriguing glimpse of what may have been Dickens' double life: the celebrated novelist stealing away for lighthearted moments of walking, poetry reading and domestic tranquility, with a bewitching and clever girl.

Despite Tomalin's research, Nelly Ternan has faded into the past—she cannot be made vivid to us because she herself sought oblivion. But Dickens still abounds. And what we make of his connection with Nelly Ternan depends on what we make of his character. The character of a writer like Dickens becomes public property and is read in the shadow of his novels. We like to imagine the creator of Micawber and Pip and Mr. Pecksniff as a figure who might take a rightful place in his own novels. But this has always been a fallacy. Tomalin quotes a remark that Dickens' daughter Kate once made to George Bernard Shaw: "If you could make the public understand that my father was not a joyous, jocose gentleman walking about the world with a plum pudding and a bowl of punch, you would greatly oblige me."

Dickens was not the "Father Christmas figure" his public sometimes imagined. He was a steam engine of a man, a figure of colossal force. He moved through the lives of his contemporaries the way the railroad moves through the slums in *Dombey and Son*, transforming everything in its wake.

He, in fact, belonged to all of England, to the nameless men and women eking out a marginal existence in the slums of Victorian London and forgotten country byways. His death would occasion a remarkable outpouring of grief and affection. Mourners thronged Westminster Abbey, many of them dropping flowers into the coffin. "There, in the ragged bundles of flowers, no doubt picked from the hedgerows and fields," writes Ackroyd, "we see the source and emblem of Charles Dickens's authority. Even to the labouring men and women there was in his death a grievous sense of loss; they felt that he had in large measure understood them and that, in his death, they had also lost something of themselves."

Some of the most remarkable scenes in both Tomalin's and Ackroyd's books are those in which we see Dickens holding a railroad timetable, hurrying to keep his many lives in hand. Ackroyd again and again mentions Dickens' love of speed, the way he walked at the vehement pace of his thinking. What you see missing in both of these books is repose, for Dickens had none to spare. With apologies to Claire Tomalin, we know nothing about the private moments Dickens spent with Nelly Ternan. One only hopes that there was rest in them for both. At Dickens' death, his great friend John Forster said, "the duties of life remain while life remains, but for me the joy of it is gone for ever more." That was not true for Nelly Ternan. She married six years after Dickens' death, living happily with her schoolmaster husband and their two children, and died in 1914. Until the end of her days, she kept her liaison with Dickens—if it did exist—a deeply guarded secret. ■

Verlyn Klinkenborg writes from Housatonic, Massachusetts.

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Additional reading

Smithsonian horizons (p. 10)

Caring for Your Collections, edited by Arthur W. Schultz, Harry N. Abrams, 1992

Amber (p. 30)

Amber: The Golden Gem of the Ages by Patty C. Rice, Kosciuszko Foundation (New York), 1987

"The Amber Room" by Michael Glenny, *Art and Antiques*, March 1989

"DNA Sequences from a Fossil Termite Oligo-Miocene Amber and Phylogenetic Implications" by Rob DeSalle, John Gatesy, Ward Wheeler and David Grimaldi, *Science*, September 25, 1992

Jurassic Park by Michael Crichton, Ballantine Books, 1990

Haiti (p. 44)

The United States Occupation of Haiti, 1915-1934 by Hans Schmidt, Rutgers University Press, 1971

Written in Blood: The Story of the Haitian People 1492-1971 by Robert Debs Heinl jr. and Nancy Gordon Heinl, Houghton Mifflin, 1978

Semper Fidelis: The History of the United States Marine Corps by Allan R. Millett, Macmillan, 1980

Intervention and Dollar Diplomacy in the Caribbean 1900-1921 by Dana G. Munro, Princeton University Press, 1964

Dolphins in captivity (p. 58)

The World's Whales: The Complete Illustrated Guide by Stanley M. Minasian et al., Smithsonian Books, 1984

The Illustrated Encyclopedia of Whales and Dolphins by Anthony R. Martin, Portland House (New York), 1990

Dolphin Societies: Discoveries and Puzzles, edited by Karen Pryor and Kenneth S. Norris, University of California Press, 1991

Consumer spies (p. 70)

Satisfaction Guaranteed: The Making of the American Mass Market by Susan Strasser, Pantheon, 1989

Advertising the American Dream by Roland Marchand, UCLA Press, 1985

The Sponsor: Notes on a Modern Potentate by Erik Barnouw, Oxford University Press, 1978

The Hidden Persuaders by Vance Packard, David McKay (New York), 1957

Peter Galassi (p. 82)

Pleasures and Terrors of Domestic Comfort (exhibition catalog) by Peter Galassi, Museum of Modern Art, 1991

Before Photography (exhibition catalog) by Peter Galassi, Museum of Modern Art, 1981

Pinball (p. 96)

Pinball 1—Illustrated Historical Guide to Pinball Machines, Volume 1 by Richard M. Bueschel, Hoflin Publishing (Wheat Ridge, Colorado), 1988

Pinball by Roger C. Sharpe, E. P. Dutton, 1977

Pinball Art by Keith Temple, Blossom Press (London), 1991

Pinball Trader (newsletter), P.O. Box 141155, Austin, Texas 78714-1155

Burgess Shale (p. 106)

Wonderful Life: The Burgess Shale and the Nature of History by Stephen Jay Gould, W. W. Norton, 1989

The Burgess Shale by Harry B. Whittington, Yale University Press, 1985

"The Reversal of *Hallucigenia*" by Stephen Jay Gould, *Natural History*, January 1992

"The Big Bang of Animal Evolution" by Jeffrey S. Levinton, *Scientific American*, November 1992

Sir Martin Frobisher (p. 119)

Archaeology of the Frobisher Voyages, edited by William Fitzhugh and Jacqueline Olin, Smithsonian Institution Press, 1993

The Three Voyages of Martin Frobisher by George Best, edited by Richard Collinson, B. Franklin Press (New York), 1963

The Life of Sir Martin Frobisher, knight, containing a narrative of the Spanish Armada by Frank Jones, Longmans, Green (London), 1878

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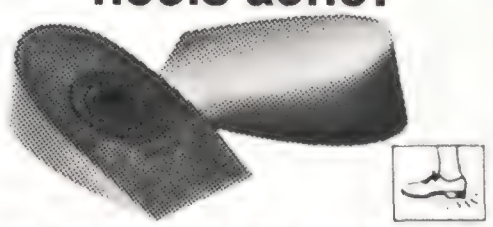

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Grand Canyon Weekend *April 22-25*

Footsteps of Coronado (New Mexico) *April 25-May 1*

Historic Philadelphia *April 29-May 2*

NEW **Four Corners Archaeology (Colorado)** *April 30-May 7*

Okefenokee (Florida) *May 1-6 Canoeing.*

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Bryce, Zion and the North Rim *May 9-19*

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Alaska Inside Passage *June 6-19*

NEW **Beyond the Bering Sea** *July 11-21* Alaska to Siberia.

Smithsonian Seminars

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Wolves of the North Country (Minnesota) *March 8-13* Track wolf packs.

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Writers and Key West (Key West, Florida) *March 28-April 1*

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The New Astronomies (Tucson) *May 16-21*

American Popular Song and Jazz (San Francisco) *May 21-25*

Virginia's Historic Gardens *May 22-27*

Southern California Ecology (Santa Catalina Island) *May 23-28*

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Curaçao, Netherlands Antilles *March 6-21* Excavate remains of giant tortoises.

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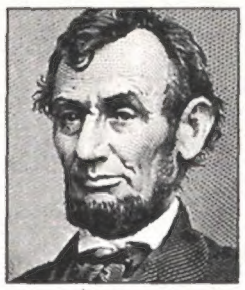

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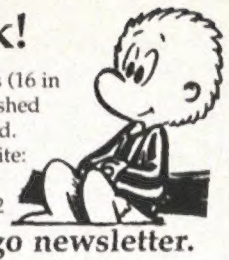

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By James R. Chiles

Call me Great or Wise, just don't call me Disorganized

You probably can't name five of your last ten teachers, but I'll bet you can identify at least five of the Seven Dwarfs. That's because those names—Dopey, Grumpy, Sneezy and the rest—are colorful adjectives that suit the character of their bearers. Likewise, if you had taken a physics course from a professor called Jonathan the Grant-Killer, you would be remembering his name right now with absolute certitude.

You'll never forget Eric the Red, either, or Richard the Lion Hearted, Attila the Hun and Ivan the Terrible. All, of course, had the "Nickname." The indexes of my history books contain more than three dozen Greats. They also list two Magnificents, a Bald, a Bold, a Silent, a Fortunate, a Peaceable, two Wises, a Short and a Tall.

Naming people by adjectives makes as much sense today as ever, and I think the custom should be revived. It would help enormously in remembering casual acquaintances at parties and might even spare some of us embarrassment at our own family reunions. But first, some background.

The golden age of the Nickname was the Middle Ages, and the reason is simple. In those days there were nobles and royalty by the hundreds, but last names weren't an accepted custom in England yet, and the English shared only a very few chosen names. A survey in 1295 found that just four names—John, Robert, Richard and William—accounted for more than half the men in the community of Huntingdon. Adjectives were the only way to keep track of all the Bills and Bobs.

The lack of a few good nicknames could create serious confusion. In September 1066, King Harold II of England was worried about the prospect of invasion from Normandy. Then he caught word of another invasion already under way, led by Harald III, King of Norway. The English Harold gathered his army and hurried north in time to catch the Norwegian Harald. Hoping to avoid a battle, Harold II sent his emissary, the royal herald (no, I'm not making this up), to talk to Harald III's representatives. But Harald III's men rebuffed Harold II's men, and the two armies began their clashing and bashing. Contemplate for a moment the plight of a bard trying to recite a ballad about the immortal words spoken between Harold's and Harald's heralds.

This skirmish proved pivotal to Western history because it sapped English military power at a crucial moment and helped the Normans win the Battle of Hastings three weeks later. Hastings ended the Anglo-Saxon monarchy in England. Yet who today has heard of either one of the kings—Harold or Harald? Just about everybody remembers the leader of the invading Normans, William the Conqueror.

This time around, the Nickname should be readily available to all, famous or not. And behold, it is: legal name-change proceedings allow it. An invented new name can't be obscene or horn in on famous personalities for profit, but just about anything else goes.

If the judge asks why you want an unusual new name, try this argument. Experts say that most Anglo-American surnames in any phone book can be traced back to an adjective or some other descriptive term chosen many hundreds of years ago. Last names usually come from just one of four things: patronyms (such as "Richardson," or "Richard's son"), medieval occupations ("Smith," for "blacksmith"), place names ("Rivers") or descriptions of one particular ancestor's traits ("Armstrong"). So tell the judge we've already tapped into the adjectival origins of surnames and you just prefer a different adjective.

In my state, for a written petition, a modest fee and a quick court appearance with two witnesses, I could reemerge to face the world as James the Magnificent. My wife and children could be Magnificent too, if they wanted to be. I could be talked into other adjectives, of course. I wouldn't mind going to an airline counter and hearing, "Here's your boarding pass, Mr. Wonderful!"

Just think what an asset a ringing, legally sanctioned name such as James T. Great could be during my next job interview. I could hit a home run when the interviewer asks, "And what is it that makes you so Great?" Or what about James the Conqueror? The interviewer would think twice before insulting me if there was a chance I might have a small army waiting outside.

It all sounds pretty good, but at this point some second thoughts might be in order. There are relatively few superlatives in the English language. After Great, Magnificent, Brilliant, Wonderful and Powerful become commonplace, what then? Latecomers are not likely to petition for names like Andrew the Bald or Susan the Nuisance, however accurate. We could end up with millions of Greats.

My pessimistic side thinks it knows where the proliferation of Great-ness could lead. Think how the title of "star"—once the pinnacle of the entertainment industry—suffered from overuse and had to be replaced by "superstar." Recording "hit" succumbed to "megahit." We could well have people trudging back to court to ask for revision to James the Super-Great or Mary the Ultra-Powerful.

So, if the Nickname ever catches on and then runs out of control, don't come to me and say I didn't warn you. Meanwhile, I'll be right there in the phone book—under "Wise, James the."

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